THE JOURNAL OF SPEECH AND HEARING DISORDERS

Volume 19 September 1954 Number 3

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EDUCATION LIBRARY

THE AMERICAN SPEECH AND HEARING ASSOCIATION

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NEWS and announcements should be addressed to: Charles R. Elliott, School of Speech, Northwestern University, Evanston, Illinois.

NOTICE TO AUTHORS

Before submitting manuscripts for publication authors should consult Information for Contributors to the Journal of Speech and Hearing Disorders, *JSHD*, 14, 1949, 93-94. Prospective authors are invited to write the Editor for copies of this Note, and of its supplement, Examples of Manuscript Form.

THIRTIETH ANNUAL CONVENTION

October 25-27, 1954, Hotel Jefferson, Saint Louis

AMERICAN SPEECH AND HEARING ASSOCIATION

Saturday, October 23
(Pre-Convention)
2:00 p.m. and 7:30 p.m.
Meeting of Executive Council

Sunday, October 24
(Pre-Convention)
9:00 a.m., 2:00 p.m. and 7:00 p.m.
Meeting of Executive Council

7:00 p.m.
National Executive Council of Sigma Alpha Eta

Monday, October 25
9:30 to 11:55 a.m.
Executive Council Desk

9:30 to 11:55 a.m.
Certification Desk

THERAPY FOR YOUNG STUTTERERS

9:00 to 11:55 a.m.

Chairman: C. Van Riper, Western Michigan College of Education

Panel Members: Contributors of selected papers
(As announced in the *Journal of Speech and Hearing Disorders*, June, 1954, p. 227)

Discussants: Wendell Johnson, State University of Iowa
Charles R. Elliott, Northwestern University
C. Van Riper, Western Michigan College of Education

CONTRIBUTED PAPERS IN CLINICAL AUDIOLOGY

9:00 to 10:25 a.m.

Chairman: William G. Hardy, Johns Hopkins University

Recruitment and the intensity difference limen. James F. Jerger, Northwestern University

The audiologic function of acoustic trauma. Donald M. Markle, Columbia-Presbyterian Medical Center

The prediction of speech reception thresholds on the basis of thresholds for clicks. Claude S. Hayes and Robert A. Butler, Walter Reed Army Hospital

A comparison of pure tone screening tests for a school testing program. Louis M. DiCarlo, Syracuse University

Discussion.

EDUCATION LIBRARY

APPLICATIONS OF RESEARCH IN EXPERIMENTAL PHONETICS IN CLASSROOM AND CLINIC

9:00 to 10:25 a.m.

Chairman: Paul D. Holtzman, Queens College

General applications of voice research. Wilbert Pronovost, Boston University

General applications of articulation and intelligibility research. T. D. Hanley, Purdue University

Evaluation and Response:
Verna Breinholt, Orange County (California) Schools
Jack Matthews, University of Pittsburgh
John H. Wiley, University of Nebraska

PROFESSIONAL PROBLEMS

9:00 to 10:25 a.m.

Speech and Hearing Conservation by Departments of Public Health. Chairman: Raymond L. Cromer, Michigan Department of Health.

Coordination of Speech and Hearing Therapy with Classroom Instruction. Chairman: Dorothy G. Kester, Akron Public Schools.

Clinicians in College and University Clinics. Chairman: Melvin Hyman, Bowling Green State University.

PSYCHOACOUSTICS

10:30 to 11:55 a.m.

Chairman: Earl Schubert, State University of Iowa

Variability of auditory sensitivity following sound exposure. Scott N. Reger, State University of Iowa (Sponsored by D. C. Spriestersbach)

Reversible auditory fatigue resulting from exposure to a pure tone. Aubrey Epstein, University of Pittsburgh

The effects of exposure to white noise on loudness balance judgments and intelligibility scores. John J. O'Neill, The Ohio State University

Listening to differentially filtered competing voice messages. Walter Spieth and John C. Webster, U. S. Navy Electronics Laboratory.

Discussion.

ORGANIC DISORDERS OF VOICE

10:30 to 11:55 a.m.

Chairman: John V. Irwin, University of Wisconsin

Pre-operative consultations in organic voice disorders. James M. Mullendore, University of Virginia

Voice problems of cerebral palsied children. Calvin Pettit, George Washington University

Juvenile voice disorders. Virgil A. Anderson, Stanford University

Laryngeal paralyses and modes of therapy. John V. Irwin, University of Wisconsin

PROFESSIONAL PROBLEMS
10:30 to 11:55 a.m.

Problems of First and Second Year Therapists. Chairman: Robert L. McCroskey, Ohio State University

Private Practice in Speech Correction. Chairman: Paul Knight, Chicago, Illinois

Sigma Alpha Eta Luncheon
12:15 to 1:45 p.m.

Certification Desk
2:00 to 5:00 p.m.

FILM THEATER
2:00 to 4:55 p.m.

Chairman: Frank R. Kleffner, Central Institute for the Deaf.

The Ears and Hearing

Fundamentals of Acoustics

Pay Attention: Problems of Hard of Hearing Child

Education for the Deaf

Ohio's Legion of Forgotten Children

Feebleminded

PROBLEMS OF TOTAL REHABILITATION FOR APHASIC ADULTS
2:00 to 4:55 p.m.

Chairman: Joseph M. Wepman, University of Chicago

Panel Members:
Florence I. Mahoney, Veterans Administration Medical Teaching Group Hospital, Memphis
Dorothea Barthel, Veterans Administration Medical Teaching Group Hospital, Memphis
Reuben S. Horlick, Audiology and Speech Correction Center, Walter Reed Hospital
Hildred Schuell, Veterans Administration Hospital, Minneapolis

General Discussion.

THE USE OF AUDITORY TRAINING IN SCHOOLS AND CLASSES FOR DEAF AND HARD-OF-HEARING CHILDREN
2:00 to 3:25 p.m.

Chairman: S. Richard Silverman, Central Institute for the Deaf

Panel Members:
Powrie V. Doctor, Gallaudet College
Margaret H. Fitzgerald, St. Mel-Holy Ghost Day School for the Deaf
Freeman McConnell, Vanderbilt University

General Discussion

FUNCTIONAL DISORDERS OF VOICE
2:00 to 3:25 p.m.

Chairman: Elise Hahn, University of California

The voice of neurosis. Paul J. Moses, Stanford University School of Medicine

Discussants:
Paul Moore, Northwestern University
Harlan Bloomer, University of Michigan

General Discussion.

PROFESSIONAL PROBLEMS

2:00 to 3:25 p.m.

State Directors of Speech Correction Programs. Chairman: Gretchen M. Phair, State of Wisconsin

Hospital Services in Speech and Hearing. Chairman: John L. Boland, University of Oklahoma School of Medicine

County Programs in Speech Correction. Chairman: Elsie Edwards, Michigan State College

COMMUNICATION RESEARCH: PROBLEMS OF SPEECH ANALYSIS AND SYNTHESIS

3:30 to 4:55 p.m.

Chairman: Arthur S. House, Massachusetts Institute of Technology

Speech compression and speech perception. J. C. R. Licklider, Massachusetts Institute of Technology

Methods of signal analysis applied to speech sounds. S. H. Chang, Northeastern University

The development of a quantitative description of articulatory events. K. N. Stevens, Massachusetts Institute of Technology

A class of oral phones with both vowel and consonant features. A. M. Liberman, J. D. O'Connor, L. J. Gerstman, P. C. Delattre, and F. S. Cooper, Haskins Laboratories

Discussion.

OVER-VIEW OF STUTTERING

3:30 to 4:55 p.m.

Chairman: Jesse J. Villarreal, University of Texas

Areas of doubt and certainty in stuttering, 1954. Wendell Johnson, State University of Iowa

Discussants:
Joseph G. Sheehan, University of California at Los Angeles
Robert West, Brooklyn College
C. Van Riper, Western Michigan College

General Discussion

PROFESSIONAL PROBLEMS

3:30 to 4:55 p.m.

Speech Correctionists in Communities under 200,000. Chairman: Marian Donewald, Evansville Public Schools

Speech Correction in Cities of 200,000 and over. Chairman: Zelda Horner Kosh, Arlington, Virginia

Presidential Address
8:00 p.m.

Business Meeting of the Association
9:00 p.m.

Sigma Alpha Eta Coffee Hour
10:00 p.m.

Tuesday, October 26, 1954

Executive Council Desk
9:30 to 11:55 a.m.

Certification Desk
9:30 to 11:55 a.m.

THE DISPLAY OF SPEECH SIGNALS

9:00 to 11:55 a.m.

Chairman: George A. Kopp, Wayne University

Recent developments in signal analysis. Harold L. Barney, Bell Telephone Laboratories

Audio communications through the skin. Earl D. Schubert, State University of Iowa

Fundamental problems and approaches in the non-auditoried presentation of acoustic stimuli. Ira J. Hirsh, Central Institute for the Deaf.

A new plastic magnetic tape sound spectrograph. Anthony J. Prestigiacomo, University of Michigan Television

Recent research in the use of visible speech for the deaf. Harriet Kopp, Wayne University

Discussion

HABIT EXTINCTION AND CONDITIONING IN SPEECH THERAPY

9:00 to 10:25 a.m.

Chairman: Virgil A. Anderson, Stanford University

Principles of learning applicable to speech therapy. George J. Wischner, Human Resources Research Office, Washington, D. C.

How can we improve our therapy techniques for functional speech disorders?

Panel:
Mary W. Huber, Los Angeles State College
Ruth Beckey Irwin, Ohio State University
Leta Winterland Timberlake, Public Schools, Santa Clara County, California

Discussion and questions

FUNCTIONAL DISORDERS OF ARTICULATION

9:00 to 10:25 a.m.

Chairman: Maurine B. Amis, University of Texas

Effect of phonic training on discrimination of speech sounds and spelling. Empress Zedler, Southwest Texas State Teachers College

Diagnosogenic factors involved in deficiencies other than stuttering. Jack C. Cotton, State University of New York State Teachers College

A comparison of the first year of oral and silent reading achievements of functional articulatory deviates with that of normal speakers. James I. Lore, Jr., Delaware Department of Public Instruction

A comparison of the reliability and validity of ratings of speech defectiveness made by lay and professionally trained judges. Jack Matthews, University of Pittsburgh

A selective articulation test of cases in kindergarten and first grade. McKenzie Buck, University of Florida, and Margaret F. Perritt, Alachua County, Florida

Discussion

INTERROGATION
9:00 to 10:25 a.m.

Private Practice and the Law
Chairman: Harold S. Edmondson, private practice, Oklahoma City
Panel members:
James V. Frick, Pennsylvania State University
Paul D. Knight, private practice, Chicago
Nathan Kohn, Jr., Personnel Consultants, Clayton, Missouri
Hyman Meltzer, Psychological Services Center, St. Louis

Research in Experimental Phonetics
Chairman: Forrest M. Hull, The Bill Wilkerson Hearing and Speech Center
Panel members:
Robert Benson, Central Institute for the Deaf
James F. Curtis, State University of Iowa
Mack D. Steer, Purdue University

Bone Conduction Audiology
Chairman: John W. Keys, University of Oklahoma
Panel members:
Raymond Carhart, Northwestern University
Ira J. Hirsh, Central Institute for the Deaf
Scott Reger, State University of Iowa Medical School
J. Zwislocki, Harvard Psycho-acoustic Laboratory

Counseling Parents in the Clinic
Chairman: John S. Wortley, Hudson River Speech Center
Panel members:
Betty Ballast, University of Oklahoma
Jane Beasley, University of Alabama
Victor Garwood, University of Southern California
Mary Schulte, St. Louis University

CLEFT PALATE
10:30 to 11:55 a.m.
Chairman: Harold Westlake, Northwestern University

WHAT IS THE RESPONSIBILITY OF THE PUBLIC SCHOOL SPEECH THERAPIST: DIRECT THERAPY, PREVENTION, SPEECH IMPROVEMENT?
10:30 to 11:55 a.m.

Chairman: Marjorie L. Burkland, Public Schools, Evanston, Illinois

Symposium Members:
Ruth Montgomery Jackson, Public Schools, Palo Alto, California
Zelda Horner Kosh, Public Schools, Arlington County, Virginia
Katsy Hart, Public Schools, Niles, Michigan
Ingeborg K. Severson, Public Schools, Milwaukee, Wisconsin

INTERROGATION
10:30 to 11:55 a.m.

Speech Therapy in the Medical Setting
Chairman: Freeman McConnell, The Bill Wilkerson Hearing and Speech Center
Panel members:
Jack L. Bangs, Houston Speech and Hearing Center
Frank M. Lassman, University of Minnesota Hospital
Richard D. Marcus, University of California Medical Center
Miriam D. Pauls, The Johns Hopkins Hospital
William M. Peacher, Syracuse University College of Medicine

Public Health Speech Therapy and Audiology
Chairman: Courtney D. Osborn, Michigan Department of Health
Panel members:
John Gaeth, Northwestern University
Arthur J. Lesser, United States Children's Bureau
Lydia Newton, The National Society for Crippled Children and Adults
Sylvia Stecher, Tennessee Department of Health
Crayton Walker, Ohio Department of Health

Therapy for Stuttering Children, Ages 4-8
Chairman: Frank B. Robinson, Miami University, Ohio
Panel members:
Philip Glasner, Maryland State Health Department
Betty Jane McWilliams, University of Pittsburgh
William Wensley, Portage Public Schools, Michigan
Gertrude Wyatt, Wellesley Public Schools, Mass.

The Social Worker in The Speech Clinic
Chairman: Mary K. Sands, Arkansas State Teachers College
Panel members:
Julia M. Roberts, Oklahoma Commission for Crippled Children
Margaret Shilling, University of Michigan

Alumni and Organization Luncheons
12:15 to 1:45 p.m.

Certification Desk
2:00 to 5:00 p.m.

FILM THEATER
2:00 to 4:55 p.m.
Chairman: Frank R. Kleffner, Central Institute for the Deaf

We Speak Again

Introduction to Aphasia

A Case Of Aphasia

The Journey Back

Endoscopic Cinematography of Ear, Nose, Throat

Palato-pharyngeal Action in Speech and Swallowing

Cinefluoroscopic Views of Normal and Post-operative Cleft Palate

Articulatory Movements in the Production of English Speech Sounds: Consonants.

APPLICATIONS OF ROENTGENOGRAPHY TO THE STUDY OF SPEECH
2:00 to 3:25 p.m.
Chairman: H. Koepp Baker, University of Illinois

Cephalography. Samuel Pruzansky, U. S. Public Health Service

Laminography. Daniel Subtelny, U. S. Public Health Service

Mensuration, Interpretation, and Use of Cephalograms and Laminagrams. H. Koepp Baker, University of Illinois, and Joanne Subtelny, Northwestern University

Ceneflurography. John Lotz, Columbia University

Applications of Ceneflurography. James Carrell, University of Washington

CURRENT RESEARCH IN STUTTERING

2:00 to 3:25 p.m.

Chairman: Charles R. Elliott, Northwestern University

Time and latency as methods of recording stuttering adaptation changes. Robert A. Schaef, University of Pittsburgh

Interpersonal relations, language learning, and stuttering in young children. Gertrud L. Wyatt, Wellesley, Massachusetts, Public Schools

Public preference for several methods of stuttering control. Thelma Hilger, Baltimore, Md.; Don Maietta, Allegheny County, Pa.; and Jack Matthews, University of Pittsburgh

Reliability and utility of individual ratings of severity of audible characteristics of stuttering. Dorothy Sherman, State University of Iowa

Play therapy for young stutterers. John Boland, University of Oklahoma

Discussion

INTERPROFESSIONAL PROBLEMS IN TREATING PERSONS WITH HEARING DISORDERS

2:00 to 3:25 p.m.

Chairman: Ira J. Hirsh, Central Institute for the Deaf.

Panel Members:
David Barnow, Beltone Corporation
Raymond Carhart, Northwestern University
William G. Hardy, Johns Hopkins University
Raymond E. Jordan, University of Pittsburgh School of Medicine
Theodore E. Walsh, Washington University School of Medicine

General Discussion

INTERROGATION

2:00 to 3:25 p.m.

The Initial Evaluation of the Speech Disordered Individual in the Clinic
Chairman: Stanley L. Berlinsky, University of Michigan
Panel members:
Harlan Bloomer, University of Michigan
Frederic L. Darley, State University of Iowa
Helmer Myklebust, Northwestern University
John Wiley, University of Nebraska

Speech Improvement or Speech Therapy; Classroom Teacher or Speech Therapist; Phonics or Phonetics in the Public School
Chairman: Sara M. Ivey, University of Arkansas
Panel members:
Genevieve Arnold, University of Houston
Mary Black, Duncan Public Schools, Oklahoma
Charles Van Riper, Western Michigan College of Education
Madeline B. Vaughan, Louisville Public Schools

Professional Relations Between Speech Therapy and Education
Chairman: Charles Parker, State University of Iowa
Panel members:
Richard S. Dabney, Jefferson Public Schools, Missouri
George J. Fortune, Cleveland Speech and Hearing Center
A. Bruce Graham, Henry Ford Hospital, Detroit

Speech Therapy in the Veterans Administration and the Armed Services
Chairman: Bruce M. Siegenthaler, Pennsylvania State University

Panel members:
Alice J. Van Deventer, U. S. Naval Hospital, Philadelphia
Claude S. Hayes, Walter Reed Army Hospital
Lois B. Senft, Walter Reed Army Hospital
Joseph M. Wepman, University of Chicago Medical School

EXPERIMENTAL RESEARCHES IN LANGUAGE

3:30 to 4:55 p.m.

Chairman: John J. O'Neill, Ohio State University

A study of the redundancy of common, three phoneme, monosyllabic words. J. Sharf, University of Michigan

A method of measuring the intelligibility of international students. Robert L. Mulder, Oregon College of Education

Concerning observer reliability of speech sound. Orvis C. Irwin, State University of Iowa

An investigation of various factors influencing the selection and repetition of words presented dichotically at a supra threshold level. Paul H. Ptacek, University of Minnesota

The effects of redundancy on articulation test performance. George Herman, University of Michigan

Discussion

CONTRIBUTED PAPERS IN CLINICAL AUDIOLOGY

3:30 to 4:55 p.m.

Chairman: Moe Bergman, New York City

The conditioned galvanic skin response under two modes of reinforcement. Clay L. Meritser and Leo G. Doerfler, University of Pittsburgh

The relation of intelligence and other factors to the ease of conditioning electrodermal responses to tone. Robert Goldstein, Central Institute for the Deaf

Some observations on the use of galvanic skin-resistance audiometry in differential diagnosis. William G. Hardy, Miriam D. Pauls, Harriet L. Haskins and P. J. LaBenz, The Johns Hopkins Medical Institutions

Differential diagnosis of disorders of communication in children referred for hearing tests. Shulamith Kastein, Columbia-Presbyterian Medical Center

Discussion

INTERROGATION

3:30 to 4:55 p.m.

Professional Training for Private Practice
Chairman: James V. Frick, Pennsylvania State University

Panel members:
Ollie Backus, University of Alabama
Harold S. Edmondson, private practice, Oklahoma City
Paul D. Knight, private practice, Chicago
Frank M. Lassman, University of Minnesota
D. C. Spriestersbach, State University of Iowa

University Training of Teachers of Lip Reading and Auditory Training
Chairman: Albert F. Johnson, Pennsylvania Department of Public Instruction
Panel members:
Alice M. Burtnett, University of Oklahoma
Leo G. Doerfler, University of Pittsburgh
Ruth B. Irwin, Ohio State University

The Status of Speech Therapy in the Public Schools
Chairman: Jack E. Pearson, Oklahoma State Department of Education
Panel members:
Mary A. Blair, Michigan Department of Public Instruction
Catherine Herndon, Oklahoma City Public Schools
Milton R. Litterst, Peoria Public Schools
Laurel Schendel, Florida State University

Professional Relations Between Speech Therapy and Psychology
Chairman: Joseph G. Sheehan, University of California at Los Angeles
Panel members:
Ollie L. Backus, University of Alabama
Jon Eisenson, Queens College
Stanley Goldstein, Veterans Administration Mental Hygiene Clinic, St. Louis
Max Nelson, Michigan State College
Margaret Hall Powers, Chicago Board of Education
O. W. Wensley, Portage Public Schools, Michigan

Sigma Alpha Eta General Assembly
7:00 p.m.

Meeting of Executive Council
8:00 p.m.

Wednesday, October 27, 1954

Meeting of 1955 Sigma Alpha Eta Executive Council
9:00 to 11:55 a.m.

Certification Desk
9:30 to 11:55 a.m.

Visit to Central Institute for the Deaf
818 South Kingshighway, St. Louis
S. Richard Silverman, Director
9:30 to 11:55 a.m.
Admission by Ticket Only

We sincerely regret that it is necessary to place a limit on the number of persons that can be received at the Central Institute on this occasion. Thus it is absolutely necessary to have a visitor's ticket in order to be admitted. Tickets will be distributed at the Registration Desk.

It is recommended that Members plan to travel to CID in groups by taxi. No busses have been reserved.

CEREBRAL PALSY AND DYSARTHRIA

9:00 to 10:25 a.m.

Chairman: E. Robert Harrington, Orthopaedic Hospital, Los Angeles

Further observations on the speech of cerebral palsied children. Orvis C. Irwin, State University of Iowa

An investigation of the breathing and speech coordinations and the speech intelligibility of normal speaking children and of cerebral palsied children with speech defects. Lucile E. Cypreansen, University of Nebraska

The rationale of speech therapy as related to cerebral palsy. Marguerite Abbott, United Cerebral Palsy

Neurological speech disorders in relation to geriatrics. Mary Huber, Los Angeles State College

Disabilities of Speech following acute bulbar poliomyelitis. Wallace Goates, University of Utah

DIFFERENCES BETWEEN STUTTERERS AND NON-STUTTERERS

9:00 to 10:25 a.m.

Chairman: R. Corbin Pennington, City College of New York

A comparison of stutterers and non-stutterers in four conditions of experimentally induced anxiety. Stanley Berlinski, University of Michigan

Comparisons of personality test scores of stutterers and non-stutterers. George Shames and Jack Matthews, University of Pittsburgh

An electroencephalographic study of frustration in stutterers. Albert T. Murphy, Boston University

A study of anxiety and hostility in a group of college stutterers and non-stutterers. Sebastian Santostefano, Pennsylvania State University

Preservative factors in a stuttering and non-stuttering population. Paul T. King, Commonwealth of Pennsylvania

Discussion

FILM THEATER

10:30 to 11:55 a.m.

Chairman: Frank R. Kleffner, Central Institute for the Deaf

Speech and Vocalization in Chimpanzees

Children Growing Up With Other People

Children Learning By Experience

Problem Children

TEACHING METHODS IN SPEECH CORRECTION

10.30 to 11:55 a.m.

Chairman: Janet M. Smaltz, Mobile Speech and Hearing Clinic, North Dakota

Short term programs for speech handicapped children. Dorothy Sheets, Public Schools, Duluth, Minnesota, and F. Edward Harris, Public Schools, Salem, Ohio

Total programing for speech stimulation in delayed speech. John Palmer, University of Washington

Teaching methods in delayed speech. Helen B. Bruce, Public Schools, Madison, Wisconsin

Teaching methods for correction of articulatory defects. Aviva Epstein, Public Schools, Chicago, Illinois, and Ida Levinson, University of Illinois

Discussion.

ESOPHAGEAL SPEECH

10:30 to 11:55 a.m.

Chairman: Warren H. Gardner, Western Reserve University

Medical treatment of cancer of the larynx. Joseph H. Ogura, Washington University

Speech rehabilitation of the laryngectomee. William F. Waldrup, St. Luke's Hospital, Chicago

Esophageal speech in relation to types of surgery, respiration and site of the pseudoglottis. G. Paul Moore, Northwestern University and Evelyn YellowRobe, Vassar College

An evaluation of the articulation errors and their relationship to the speech intelligibility of laryngectomized persons. Gilbert R. Herer, Syracuse University

Demonstration of esophageal speech by laryngectomized persons.

Association Luncheon

12:15 p.m.

Reservations must be made by Tuesday evening, October 26, at 5:30 p.m. Tickets may be obtained at the Registration Desk.

Association Business Meeting

Meeting of Executive Council

3:00 p.m.

THE USE OF PSYCHOTHERAPEUTIC TOOLS IN GROUP THERAPY

3:00 to 4:25 p.m.

Chairman: Ann Madsen Dailey, Veterans Administration Hospital at St. Louis

The rationale; using the tools with children. Lois Brien, Alabama Polytechnic Institute

Using the tools with parents. Edward Matis, Florence (Ala.) State Teachers College

Using the tools with parents. Alathena Smith, John Tracy Clinic

Acquiring the tools in professional training. Louise M. Ward, University of Alabama

Program arranged by Ollie Backus, University of Alabama.

THE EFFECTS OF HEARING ONE'S OWN VOICE

3:00 to 4:25 p.m.

Chairman: Chester J. Atkinson, State University of Iowa

An experimental investigation of speech disturbance as a function of the frequency distortion of delayed auditory feedback. Forrest M. Hull, Vanderbilt University

Studies in human side-tone: The effect of experimentally introduced changes in the external side-tone channel upon speaker intelligibility. Robert W. Peters, Ohio State University

An exploratory investigation of the effects of some variables involved in hearing one's voice among children with impaired hearing. Louis M. DiCarlo, Syracuse University

A study of individual differences in adaptation to delayed side-tone. William R. Tiffany, University of Washington

The effect of speaker environment on word intelligibility. Keith K. Neely, Defense Research Medical Laboratories

Distribution of speech energy around the human head in various acoustical environments. R. W. Benson and D. Gast, Central Institute for the Deaf

Discussion.

PUBLIC HEALTH
PROGRAMS IN SPEECH AND HEARING

3:00 to 4:25 p.m.

Chairman: Jeannette Frasier, University of Illinois
Division of Services for Crippled Children

Speech and hearing services in a state health department. Crayton Walker, Division of Child Hygiene, Ohio Department of Health

Speech and hearing services in a state crippled children's service. Sylvia Stecher, Tennessee Health Department

Speech and hearing services in a division of vocational rehabilitation. Robert Roach, Institute of Logopedics

Coordinating statewide speech and hearing services. Mary L. Thompson, Chicago Hearing Society

Discussion

TEACHING MATERIALS

An exhibit of teaching materials, chiefly non-commercial items employed in speech and hearing therapy, is being arranged for the national convention in St. Louis. Members who have materials which they would like to share with other members of the profession are invited to write to Dr. Dorathy Eckelmann, chairman of this exhibit, Speech Clinic, Illinois State Normal University.

It should be noted that while every effort will be made to display the items loaned in such a way as to prevent loss or breakage, the American Speech and Hearing Association cannot assume responsibility for loss or damage to materials submitted.

Post-Operative Velo-Pharyngeal Movements In Cleft Palate Cases

McKenzie Buck

IN CLINICAL procedure much time has been spent in administering exercises intended to strengthen the movement of the velum in a posterior-superior direction and to encourage movement of the pharyngeal wall in an effort to approximate a closure of the velo-pharyngeal valve. Thus far, in the experience of many clinicians, there has been little or no success. Most of the X-ray studies to date have been concerned with the examination of normal structures. The current X-ray study was concerned primarily with unilateral post-operative cleft palate cases. Perhaps the study of these 20 cleft palate cases will explain, in part at least, the lack of successful approximation of these structures in post-operative cases.

Vertical Shift of the Velum

In an earlier paper (*1*) the procedure for obtaining and measuring the X-ray plates of the normal and the cleft palate subjects was discussed at length. As stated therein, the vertical shift of the velum was obtained by measuring the distance from the most superior surface of the velum and the bony line of the hard palate during vowel phonation.

The differences observed between the two groups for this measurement of vertical shift of the velum are small and vary in direction. As may be seen in Table 1, none of them approaches statistical significance. For both groups the standard deviations and the ranges of measurement are wide. In both the normal and the cleft palate groups there were individuals who showed little or no movement above the bony line of the hard palate, and in both groups there were individuals who showed extensive upward movement of the velum. With respect to this movement the cleft palate group presented wider ranges; this was somewhat unexpected and perhaps requires some discussion.

It is not surprising that some cleft palate subjects showed no upward movement of the velum, since it is obvious that surgical damage may result in immobilization of the muscular structure required for this movement. What is not so obvious is that surgical injury may account also for extensive upward movement of the velum. Whenever surgical damage results in partial or complete destruction of antagonistic muscle action, tending to oppose elevation of the velum, excessive upward movement of the velum may be expected. Such destruction of antagonistic muscle action may occur in several ways: (a) fracture of the

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hamulus; (b) injury to the tensor muscles of the velum; (c) severing one or more of the faucial pillars. Surgical damage to the faucial pillars was noted in making oral examinations of several subjects in the cleft palate group.

It may be noted further that this excessive vertical movement may occasionally make it possible for a cleft palate subject to approximate a closure of the nasal port. This occurs when there is a considerable amount of adenoidal tissue present and the velum can be brought into approximation with this adenoidal tissue rather than with the pharyngeal wall. Such an instance will be discussed later in this paper. The X-ray plates showed adenoidal tissue present in 19 of the 20 cleft palate subjects.

The presence of adenoidal tissue also accounts for the absence of vertical movement of the velum observed in certain of the normal subjects. It is obvious that, if the adenoids are sufficiently enlarged, this movement will be inhibited. In the sample of normal subjects, some adenoidal tissue was observed to be present in 19 of the 20 cases.

Horizontal Shift of the Velum

Table 1 also shows measurements of horizontal movement of the velum during phonation. Rather large differences were found for this measurement, as might be expected, the cleft palate group showing considerably less movement. These results tend to confirm the common observations made in oral examination of individuals who have had extensive surgical repair of the velum. For each of the vowels [ɑ æ i u] the difference between the groups for this measurement was highly significant statistically. In each case the value of t was greater than that required for the 0.1 per cent level of confidence.

Movement of the Posterior Pharyngeal Wall

Table 1 likewise presents data dealing with the anterior movement of the posterior wall from rest to vowel phonation. This measurement was not obtained in the conventional manner of X-ray superimposition. The technique utilized by Wolfe (*3*) was employed here. The distance between the most anterior projection of the tubercle of the Atlas to the most anterior projection of the bulge of Passavant's pad was measured along the horizontal line passing through the tubercle of the Atlas and parallel to the Frankfort line.

The movements of the posterior pharyngeal wall were similar to those found by Wolfe in his [ɑ] and [æ] positions. The mean movement for the normal group in this study was 1.20 millimeters on the vowel [ɑ] as compared with .91 millimeters reported by Wolfe. The mean movement for the vowel [æ] in this study was 1.12 millimeters for the normal group; Wolfe reports 1.31 millimeters.

Comparison of the two groups considered in this study shows somewhat smaller average movement for the cleft palate subjects in all the vowels except [ɑ] although none of the differences is statistically significant. It is interesting to note that the normal group presented considerably smaller pharyngeal wall movements on the [i] and [u] vowels, with means of .82 millimeters and .85 millimeters respectively, as compared with means of 1.20 millimeters and 1.12 millimeters for the [ɑ] and [æ] vowels. The cleft palate group shows a somewhat similar pattern in variation of the mean extent of the movement from vowel to vowel.

TABLE 1. Measurements of the movement and openings of the velo-pharyngeal structures. All values in millimeters.

		a	æ	i	u
Vertical shift of the velum	*Normal*				
	M	3.21	3.84	3.56	4.31
	SD	1.44	2.59	2.18	3.07
	Range	.0 to 5.6	.3 to 8.5	.0 to 8.2	.0 to 10.1
	Cleft Palate				
	M	3.22	3.37	4.21	3.29
	SD	3.06	3.04	3.24	4.41
	Range	.0 to 7.0	.0 to 9.2	.0 to 11.4	.0 to 16.4
	Differences				
	M	−.01	.47	−.65	1.02
	SE	.24	.74	.76	1.08
	*t**	.04*	.62	.85	.94
Horizontal shift of the velum.	*Normal*				
	M	15.69	16.00	16.58	15.15
	SD	5.80	4.54	5.04	5.09
	Range	1.3 to 26.4	7.7 to 27.4	5.4 to 27.0	.9 to 26.1
	Cleft Palate				
	M	6.16	7.63	6.10	6.47
	SD	4.23	4.39	3.85	3.98
	Range	.0 to 15.6	.2 to 17.2	.0 to 16.0	.0 to 14.0
	Differences				
	M	9.53	8.37	10.48	8.68
	SE	2.77	1.23	2.00	1.99
	t	3.44	6.80	5.24	4.36
Posterior pharyngeal wall movement at the level of the tubercle of the Atlas.	*Normal*				
	M	1.20	1.12	.82	.85
	SD	1.33	2.09	.28	1.05
	Range	.0 to 4.7	.0 to 3.9	.0 to 2.9	.0 to 3.5
	Cleft Palate				
	M	1.28	.83	.48	.23
	SD	3.60	3.04	.40	1.19
	Range	.0 to 4.7	.0 to 3.1	.0 to 3.0	.0 to 3.5
	Differences				
	M	−.08	.29	.34	.62
	SE	.35	1.47	.32	.33
	t	.22	.19	1.06	1.87
Smallest velo-pharyngeal opening during phonation	*Normal*				
	M	.15	.36	.26	.12
	SD	.35	1.69	2.35	.30
	Range	.0 to 1.3	.0 to 2.1	.0 to 2.9	.0 to 1.0
	Cleft Palate				
	M	4.50	4.16	4.88	5.44
	SD	1.17	2.89	4.15	4.32
	Range	.5 to 13.3	.4 to 10.7	.0 to 16.1	.5 to 13.4
	Differences				
	M	−4.35	−3.80	−4.62	−5.32
	SE	.76	.70	1.00	.31
	t	5.72	5.42	4.62	17.16

*t ($df = 19$): 0.1% = 3.88; 1.0% = 2.86; 5.0 % = 2.09.

Velo-Pharyngeal Opening

Data concerning the smallest velo-pharyngeal opening are found in Table 1. This measurement does not express, necessarily, the distance between the pharyngeal wall in the region of Passavant's pad and the velum. For the cleft palate group the smallest opening nearly always occurred between the velum and the adenoidal tissue. As a matter of fact, only one of the 20 cleft palate subjects showed sufficient horizontal movement of the velum to approximate closure in the region of Passavant's pad. The most important single point to be made concerning these data is that they confirm the clinical observations of a substantial velo-pharyngeal opening in cleft palate subjects. For each vowel the significance of the difference between the groups is beyond the 0.1 per cent level of confidence. Not only are the differences highly significant in a statistical sense, but their magnitude is striking. The mean openings in the cleft palate group ranged from 4.16 millimeters for the [æ] to 5.44 millimeters for [u], while the mean openings for the normal group ranged from .12 millimeters for [u] to .36 millimeters for [æ].

To illustrate the meaningfulness of these data: one of the cleft palate subjects was observed to have relatively little nasality and the examiners commented upon the excellence of his voice quality. A separate comparison was made of his measurements with those of normal subjects and of cleft palate subjects who had been adjudged highly nasal. For convenience in the following discussion, this individual will be referred to as Subject X.

Subject X, age 19 years, was the oldest member of the cleft palate group. Prior to his seventeenth year

TABLE 2. The oral and pharyngeal measurements of Subject X compared with identical measurements of the normal and cleft palate groups.

	Mean for Subject X	*Mean for Normal*	*Mean for Cleft Palate*
Maxilla Width	60.4	60.5	55.3
Maxilla Length	53.0	48.1	42.1
Mandible Length	83.4	81.7	77.0
Proportional Measurements of:			
Total Tongue Area (rest)	.98	1.40	.90
Anterior Tongue Area (rest)	.55	.57	.52
High Point of Tongue from Incisors (rest)	.49	.49	.50
Pharyngeal Openings:			
On the Incisal Line (rest)	13.2	13.6	14.3
Below the Incisal Line	8.5	8.8	8.9
High Point of Tongue Below the Palate	6.4	5.1	8.1
Vertical Shift of the Velum	10.9	3.2	3.2
Horizontal Shift of the Velum	10.4	15.7	6.2
Posterior Pharyngeal Wall Movement	1.5	1.2	1.3
Smallest Velo-pharyngeal Opening	.5	.15	4.50
Lip Opening	16.5	16.4	17.3
Mouth Opening	12.7	13.1	13.0

the only surgical repair he had undergone was the repair of the cleft lip; at age 17 surgical repair was performed on the hard palate and velum.

Table 2 presents comparisons between Subject X and the means obtained for the two groups of subjects on selected measures of the oral and pharyngeal structures and their movements. The fact that Subject X was at the extreme in the age range included in this study makes a comparison of his measures with the mean values of the group less valid than would be a comparison with a group of his own age. It seemed better, however, to make a comparison with the average values of the group rather than of one or two selected individuals.

Examination of the data in Table 2 shows notable similarity between the measures for Subject X and the measures for the normal group. The similarity in the measure 'Structural Size' is particularly striking. Subject X did not appear to present the maxillary and mandibular under-development shown by the cleft palate group as a whole. The fact that surgical repair of the palate was so long delayed in this case may be significant. It seems to confirm the findings of Graber (2) to the effect that non-operated cleft palate subjects show maxillary and mandibular development essentially normal in all respects.

Further examination of the data shows that measures of tongue position and movement of Subject X are quite similar to the corresponding average measures of the normal subjects. Also, in considering the measures of palatal movement and velopharyngeal opening, Subject X is much closer to the mean values of the normal group than he is to the means of his cleft palate brothers. This is particularly noticeable with respect to the horizontal movement of the velum and the measure of the velo-pharyngeal opening. It may be noted that Subject X achieves greater horizontal movement of the velum than does the average of the cleft palate subjects, although it is somewhat below the mean of the normal group.

Table 2 presents what is probably the most significant of all the comparisons, so far as concerns relative normal voice quality. This is the comparison of the measures of the velopharyngeal opening. It may be noted that Subject X, for the vowel [ɑ] showed a measure of 0.5 millimeters compared with an average of 4.5 millimeters for the cleft palate group. Although this value is somewhat greater than the average of the normal group, it lies well within the range of the normal subjects, which extended from 0 to 2.9 millimeters.

In achieving this degree of closure the extreme vertical movement of the velum exhibited by Subject X is important, because the closure he obtained is against the *adenoidal tissue*, not against the pharyngeal wall. His measure of vertical movement was the greatest found for any of the subjects studied. For [ɑ], it was found to be 10.9 millimeters. The point at which the closure is made is approximately 10 millimeters above Passavant's pad, and 15.8 millimeters anterior to the posterior pharyngeal wall. In short, although oral examination of Subject X showed a very large opening between the velum and the posterior pharyngeal wall, he achieves nearly normal speech by extreme vertical movement, and a fair degree of horizontal movement of the velum, which enables him to achieve a closure against the adenoidal tissue.

Figure 1 presents the X-ray tracings of Subject X and his matched normal subject, as compared with the X-ray

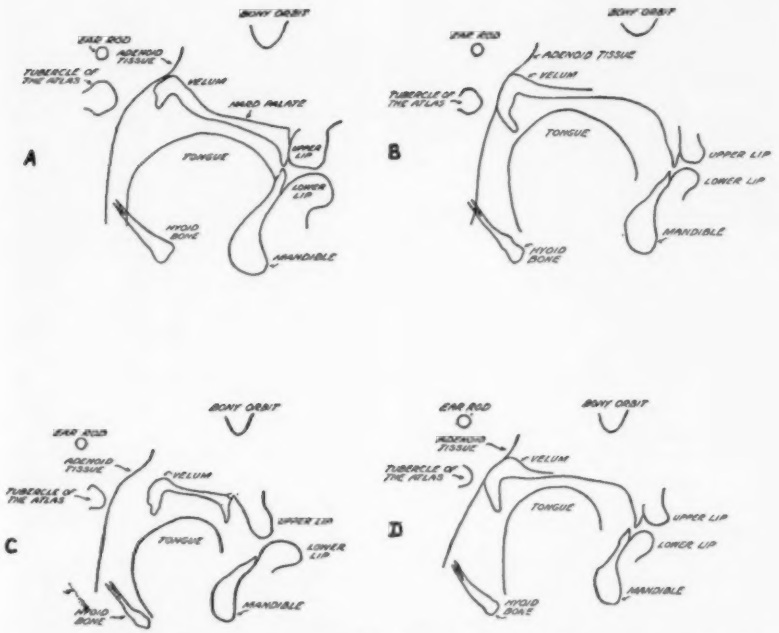

FIGURE 1. X-ray tracings of the least nasal cleft palate subject (A) and the normal subject with whom he was matched (B), compared with the most nasal cleft palate subject (C) and the normal subject with whom he was matched (D). All tracings represent the vowel [u].

tracings of the most extremely nasal cleft palate subject and his matched normal subject.

It may be added that the findings on Subject X re-emphasize the importance of velo-pharyngeal closure in obtaining satisfactory speech. This subject differed importantly from the other cleft palate subjects in only two respects: (a) the relatively normal size of his facial and oral structures; (b) in being able to achieve fairly complete closure of the nasal port.

Summary and Conclusions

1. The findings here reported indicate that there are marked differences in velar activity between cleft palate and normal subjects. Measurements of the horizontal movement of the velum from rest to vowel phonation positions are significantly smaller in the cleft palate group. In this group the velum moves in a predominantly vertical direction. When any approximation to closure of the nasal port occurred in this group it was typically a closure of the velum against adenoidal tissue. In only one case of the group of 20 cleft palate subjects did the velum come close enough to the superior constrictor to approximate a closure at that level.

2. The dimensions of the velopharyngeal opening during phonation of vowels are significantly greater in

the cleft palate group than in the normal group; the mean differences for the various vowels studied range from 3.80 millimeters to 5.32 millimeters.

3. The anterior movement of the posterior pharyngeal wall is similar for both groups in that the average extent of this movement is very small.

4. These findings indicate that an X-ray study of rest and vowel positions might be made before speech therapy is initiated. If the velum is moving in a predominantly vertical direction and not approaching the normal level of closure in the region of Passavant's pad, muscle training of the posterior pharyngeal wall would seem to be of little value.

5. In view of the fact that some of the cleft palate subjects were approximating a velo-pharyngeal closure against adenoidal tissue, it would seem advisable, when such a closure is in effect, to avoid adenoidectomy if at all possible. In cases showing extreme upward movement of the velum during phonation, removal of the adenoidal tissue eliminates the only chance of making or approximating a closure of the nasal port.

6. When an adenoidectomy is necessary in cases where the velar movement is predominantly in a vertical direction, it would seem that consideration should be given to the fitting of an obturator or speech appliance. This appliance would extend back toward the region of the superior constrictor and could substitute for the excessively raised velum in achieving a closure with the pharyngeal wall.

7. The data of this study would seem to indicate that the problem of nasality in the cleft palate patient is concerned mainly with the effectiveness of velo-pharyngeal closure, since it was in this respect that the two groups in the study differed most radically. Further evidence of the importance of this closure was obtained by the study of the cleft palate subject who achieved reasonably adequate speech.

References

1. Buck, M. Facial skeletal measurements and tongue carriage in subjects with repaired cleft palates. *JSHD*, 18, 1953, 121-132.
2. Graber, T. M. An appraisal of the developmental deformities in cleft palate and cleft lip individuals. *Quart. Bull.* (Northwestern Univ. Med. School), 23, 1949, 153-159.
3. Wolfe, W. G. X-ray study of certain structures and movements involved in naso-pharyngeal closure. M.A. Thesis, State Univ. Iowa, 1942.

An Experimental Study Of Disorganization Of Speech And Manual Responses In Normal Subjects

Harris E. Hill

SEVERAL attempts have been made quite recently to develop systematic learning and conditioning theories of stuttering, (*7, 32, 37, 38, 39*). In general these efforts have been directed toward describing conditions which might be responsible for the persistence of such apparently non-adaptive speech behavior. Learning theorists usually begin with clonic and tonic blocking and avoidant reactions which are assumed to be present in the repertoire of the individual, and to be conditionable or modifiable through learning. These may be valid points of departure for such formulations; however, the *origins* of these reactions might be highly significant for the development of theory.

The present study is concerned with experimental manipulation of two conditions that have been assumed by some to be partially responsible for initial clonic and tonic blocking. Main emphasis is placed here upon penalty and threatened penalty during speech as a possible source of disturbance, while secondary emphasis is placed upon ambiguity of the stimulus situation. The general theoretical background was proposed by Hill (*12, 14*). He suggested that the *initial* phases of stuttering are manifestations of stimulus-response disorganization. The early work of Bonnett (*3*) is also suggestive of this type of formulation, as are the investigations of Luria (*24*), Goldstein (*6*), and the recent reports on the effects of delayed verbal feedback (*1, 21, 22, 23*).

'Disorganization' as used in this paper derives from the interbehavioral formulations of Kantor (*19*). It denotes a break in the psychological or functional stimulus-response relationship.[1] A great many factors determine when, where and if behavior that a person is capable of performing will or will not occur. Assume that a person is capable of a response and that the demanding conditions are present. If there is also present an unfavorable condition, the individual may be entirely incapable of performing it; or if the response occurs, it may lose its tightly knit character and be disjointed or inefficient. For present purposes, then, disorganization or inefficiency of response will denote the

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[1]The failure of stimulus-response coordination has been given comprehensive consideration by Hill (*12, 14*). He showed that some of the effects of stuttering are similar to some of the effects of surprise and startle. The latter effects provided the closest approximation to disrupted behavior (emotional behavior segment) that could be found in the experimental literature.

divergence of responses obtained under penalizing experimental conditions from those obtained under control conditions.

Three classes of conditions appear to determine the *readiness* of an individual to respond (readiness may be equated with 'set,' or with 'motivation,' *cf. 20, 15*); that is, three types of conditions appear to determine whether previously acquired behavior will occur and, if it occurs, whether it will be organized or disorganized. This concept of organization and disorganization would appear to be applicable to all overt behavior, at least, and would not merely be specific for speech. The generality of the concept as well as a few of its implications for stuttering were dealt with by Hill in Pronko and Bowles (*11*).

Probably the most definite class of conditions of the three is concerned with the stimulus. Unfavorable conditions of this class which may contribute to behavior disorganization have been shown experimentally to include the effects of stimuli being too numerous (*16*), ambiguous (*31*), too difficult for discrimination (*29*), and demanding incompatible responses (*40*).

As an example of the second, or organismic, type of condition which may contribute to stimulus-response disorganization, the writer cites his observation of language responses of persons chronically intoxicated with barbiturates. The conversation of these individuals is frequently interrupted by severe tonic blocking that is quite analagous to the late primary stage of stuttering as described by Van Riper (*32, 33*). The parallel if not the identity of this non-fluency with stuttering is striking. Exogenous drug effects, however, are of little significance as variables that either precipitate or maintain stuttering, although it is quite obvious that various effects of anxiety-produced endocrine secretions are unfavorable for efficient response. Also, prolonged or extreme smooth and striate muscle hypertonicity are organismic conditions which may contribute to response disorganization (*8, 4*).

General situational conditions constitute the third type of condition or setting that may exert unfavorable influences on behavior. These include the auspices or conditions under which the particular behavior occurs, e.g., school, church, type of audience, etc. A study by Patrick (*28*) may be used as an example. He reports that if subjects are forced to perform under penalizing situational stimuli their behavior changes from definite, adaptive responses to relatively implastic, unadaptive, repetitive sorts of action.

In general the effects of the three types of conditions which have been mentioned are short term; they are characteristic of an individual only when he is in the penalizing situation, for the disturbed responses do not become an integral part of the individual's behavior equipment unless the conditions are repeated. The overt manifestations of such short term behavior disorganization, as opposed to those of a recurring difficulty, seem to be rather limited. The response may be disjointed or stilted. Part of the response in progress may be prolonged or repeated (*9*). The response may be fragmentary in nature, or the expected response may be entirely absent while a seemingly irrelevant action is substituted (*3, 9*).

The present study, then, was designed in this framework, and tested indirectly one aspect of the hypothesis that the *initial* phases of stuttering are manifestations of stimulus-response disorganization. The working hypoth-

esis was that threat of penalty (electric shock) will produce disorganization of propositional speech of adult normal speakers which is similar to the non-fluency found in primary stuttering.[2] If significant speech disorganization were shown to occur under these conditions it might be interpreted as being correlated with unfavorable anticipatory responses to threat of penalty.

Subjects, Apparatus and Procedure

The total of 55 psychology student Ss was reduced to 30 (17 women, 13 men) because some were used in exploratory work, the recordings of others were spoiled by apparatus difficulty and because a very few others omitted one of the three desired responses under control conditions. None of the subjects exhibited speech disturbance when questioned about speech history or during control procedures.

In brief outline, a practice period preceded the obtaining of control records during which the subjects learned to perform certain right- and left-hand movements and propositional speech simultaneously for a 5-second period upon the presentation of light stimuli. Subsequent to obtaining control recordings, an electrical shock was paired with the light stimuli for several trials. Recordings were then obtained for a number of experimental trials in which the procedure was the same as it had been for the control period. The divergences of the experimental from the control readings were the pertinent data.

Specifically, a panel carrying a microphone, three neon bulbs at eye level, and two finger keys, was mounted above a table which was secured to the inside wall of an electrically shielded screen compartment. A red bulb was placed slightly below an orange and a purple bulb. The two 18-inch keys were placed at a height above the table to allow comfortable securing to the subject's index fingers. The keys were mounted at center and passed through the wall of the compartment where they were fastened to capillary pens which acted directly on the chart paper of an Esterline-Angus polygraph that moved at three inches per second. Speech was recorded on a Pierce magnetic wire recorder.

The electronic shocking instrument used (*33*) had been constructed from suggestions by Muenzinger and Walz (*26*). The grid tubes were so arranged that any direct current up to 8-9 milliamperes could be applied to the subject; the men were shocked at a full scale reading, and the women at approximately 6-7 milliamperes. Shocking electrodes were fastened with adhesive tape over the calf of the subject's left leg (*triceps surae*).

Upon entering the experimental room the subject was familiarized with the general aspects of the task and his misgivings were allayed as far as possible. He was then seated at the table, the electrodes used for shocking and for recording EMG and EEG[3] were attached, and his index fingers

[2] The writer prefers a definition of primary stuttering that is based on speech interruption without anticipation of speech difficulty. It was unfortunate, however, that the subjects of the present study were not asked to report the presence or absence of such anticipation at the end of the experimental sessions. For a discussion of current views on the definition of primary stuttering see Glasner and Vermilyea (*5*).

[3] The electrophysiological measures will be reported later (*10*). Muscle action potentials were recorded from the sternocleidomastoideous muscle by means of surface electrodes. Under the specified conditions variations in muscle tension at this location were considered by the writer to be indications of changes in generalized tonus.

were secured to the keys. The integration of the responses was begun by giving practice in making to-and-fro movements of the right index finger at a rate of approximately three per second. These were begun when the red light flashed and were continued for five seconds on each trial. After these movements were performed easily, left-hand movements were included in the procedure: Two seconds after the appearance of the warning signal and the beginning of the right-hand movements, either the orange or the purple light was lit for two seconds. If the orange light appeared, the subject made one complete to-and-fro movement with the left hand; if the purple light flashed, the subject made two such movements.

After efficient integration of the finger activities had occurred, the subject combined verbal responses with them. Two of the more neutral Murray Thematic Apperception cards (27, Nos. 2 and 9 MB) were placed slightly to one side of the stimulus panel. The subject's task was to compose, *between trials*, statements concerning the card. They were told that each statement should be approximately six seconds in duration and that each should begin with the presentation of the red light. A new statement was to be composed for each trial. The integration of these three concurrent activities to a point at which they could be performed easily with only minor breaks was rather difficult for most subjects, and required approximately 30 to 40 minutes of practice.

The general procedure was as follows: The experimenter started the various instruments and said, 'Ready.' Speech and right-hand movements were begun by the subject when the red light appeared. Then, when the orange or purple light appeared two seconds later, the required one or two movements were made with the left hand. The entire procedure lasted about six seconds and was terminated when the experimenter said, 'Stop.' Trials were separated by approximately 30-second intervals.

After a satisfactory performance was attained, the subject was told that

TABLE 1. Experimental design: conditions, number of trials, and stimuli used.

Block of Trials	*A*	*B*	*X*	*C*	*D*	*E*
Condition	Control	Ambiguous Stimuli	Shock	Threat of Penalty	Threat of Penalty	Threat of Penalty
Number of Trials	6	1	6	6	6	6
Stimuli	O & P Alternately	O & P Simultaneously	O & P Simultaneously (Same as B) (Plus Shock)	O & P Alternately (Same as A)	O & P Simultaneously (Same as B)	O & P Alternately (Same as A)

he might be shocked at any time if he were warned beforehand. He was then told that further practice was necessary. Several trials were completed, alternating the orange and purple lights. Then without stopping and without informing the subject, the test trials were begun. Six control trials, Table 1, Block A, were obtained first; three trials to the orange and three to the purple stimulus light were obtained in balanced order. The next trial, designated B in Table 1, was the same as those of A except that both stimulus lights (O and P) were presented simultaneously. This was the only unexpected or ambiguous condition in the experiment and the Ss, of course, had not acquired a response for this stimulus presentation.

The next block of six trials indicated as X in Table 1 were given for the purpose of combining the light stimuli with penalty (shock) and were not used in any computations. The stimulus presentation was the same as in B. The subjects were told that the response for the simultaneous presentation of the O and P lights was a combination of those made to them singly—three movements of the left-hand key. The shock was applied at the same time that the lights were presented. It was assumed that by means of this modified conditioning procedure, the red or warning signal would be correlated with (i.e., institute) unfavorable anticipatory responses in subsequent trials.

As shown in Table 1, the stimulus presentation for the remaining blocks of responses was the same as in either A or B without shock: Block C was a repetition of A; D, a repetition of B; and E was another repetition of A. Six trials were run in each of the blocks except B. It should be noted that speech requirements were the same for all procedures; the change in stimulus conditions were only concerned with finger movements.

Before response disorganization is altered by conditioning or learning it appears to last no longer than one or two seconds. In the present study there was little opportunity for conditioning to occur other than that of affective or non-specific tension reactions. Therefore, manual response disorganization was measured from the onset of the purple or orange stimuli over a period of one second only, or, to and including the last response started within that second.

Speech was played back on the recorder and judgments were made by the experimenter of the disorganization on each trial according to the following criteria:

0. No unusual speech disturbances.
1. Slight stops or 'stilted' speech.
2. Slight blocks, slight repetition or slight prolongations.
3. Complete stopping, complete blocking or pronounced repetition or prolongation.

In most cases, at least two judgments were made of all ratings which were greater than 0. In most instances in which a rating of 3 was assigned, the record was judged four or five times. All judgments were made previous to and independent of the measurement of other responses.

Disorganization of the movements of each hand was classified on a four-point scale (0, 1, 2, 3), 3 representing the greatest disruption. When the movements of both hands were disturbed to the greatest extent, a combined rating of 7 was assigned. Criteria for hand-movement disorganization are given in the original dissertation (*9*) and are too detailed to be reported here. The responses obtained in the experimental trials were measured, however, and compared with those recorded during the control

TABLE 2. Comparison of mean combined disorganization values for the various conditions.

Means		*Mean Diff.*	*Sigma Md.*	*t*	*P*
A 3.15	B 6.30	3.15	.435	7.24	<.001
A 3.15	C 4.58	1.43	.189	7.57	<.001
A 3.15	D 4.21	1.06	.235	4.08	<.01
A 3.15	E 3.71	.56	.192	2.92	<.01
C 4.58	E 3.71	.87	.181	4.81	<.01

trials. In general the criteria consisted of losses or gains or other changes in amplitude and cycle time, together with the more indicative performances in which delays, omissions, or additions occurred. A reliability coefficient of .98 was obtained between independent scorings of 10 complete records.

Mean disorganization measures for each block of responses were calculated separately for speech, and for both hands combined. And, since a total disorganization score was desired, mean disorganization measures for the combined ratings of all three activities were computed. The latter method, then, gave a combined scale that extended from 0 to 10. The difference method for obtaining critical ratios, or *t*'s, and correlations in one process was used for testing the significance of the differences between the means (*30*).

Results

Combined Disorganization Measures (mean values for both hands and speech): It may be seen in Table 2 that the mean for Block A was 3.15, the largest possible value being 10. This average reflects the difficulty of the task even though no penalty or ambiguous stimuli were presented. Condition B, the presentation of ambiguous stimuli, produced a mean disorganization value that was significantly greater than the mean of A ($P = < .001$). Under condition C, which was the same as A except for the intervening shocking trials, a very significant increase over A was also present ($P = < .001$). The penalty of the shock trials also exerted a strong unfavorable influence in D and E; however, there was a gradual and consistent decrease in disorganization from C to E, indicating that significant adaptation occurred. Nevertheless, the mean of E was still greater than that of A at the one per cent level of confidence.

Manual Response Disorganization: Tabular material is not given on manual responses, but the outcome is shown in Figure 1. The mean for B was significantly greater than that of A ($P = < .05$), that for C was also greater than A ($P = < .001$), as was D ($P = < .01$). The mean of E

was not significantly greater than A, but was significantly less than C ($P = < .01$) indicating that recovery or adaptation of manual responses occurred rather quickly.

Speech Disorganization: Table 3 and Figure 1 present data on speech; the greatest possible measure of disturbance was 3.00. Condition B produced the greatest mean disorganization score being significantly greater than A ($P = < .001$). The threat of penalty also resulted in disorganization values for conditions C, D, and E that were well beyond the one per cent level of significance. Although adaptation occurred at a very uniform rate, E being significantly less than C, the disorganization value of E was still significantly greater than that of A.

The high speech disorganization value found in B appeared to be due to the ambiguity of the stimuli for manual responses which produced a greater number of complete stops or omissions in speech than did the conditions of C, D, and E. Although the mean disorganization value was greatest in B, the subjects did not seem to be under stress; the muscular action potential measures, for example, were not increased over A. The speech disorganization that occurred in C, D, and E, in contrast to B, however, appeared to be more compulsive and perseverative. Also, muscular action potential measures were increased in C, D, and E as compared with B.

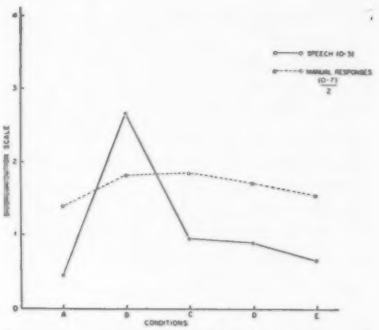

FIGURE 1. Mean disorganization values for (1) speech, and (2) both hands combined divided by two. It should be noted that, except for B, the curves are parallel.

Except that there was no evidence of later speech disorder outside of the laboratory, many of the speech responses that occurred at the time of

TABLE 3. Comparison of speech disorganization values for the various conditions.

Means		*Mean Diff.*	*Sigma Md.*	*t*	*P*
A / .45	B / 2.67	2.22	.165	13.48	<.001
A / .45	C / .95	.50	.115	4.35	<.001
A / .45	D / .89	.44	.109	4.04	<.001
A / .45	E / .66	.21	.073	2.88	<.01
C / .95	E / .66	.29	.118	2.46	<.03

stimulus presentation in B, C, D, and E, appeared to the writer to be quite indistinguishable from what is generally termed stuttering. Usually, the disorganization was not severe; however, the interruptions of several of the subjects would have been classed as severe in any speech clinic. Usually, the interruptions that occurred in C, D, and E were clonic vocal reactions or an excess of vocalization that was rigid and prolonged.

Discussion

As would seem obvious, the complex behavior of the control trials, Block A, resulted in some inefficiency. Thus, under certain circumstances, the demanding of very complex behavior is productive of some disorganization. Condition B, simultaneous presentation of both stimulus lights, produced a very significant increase over A. Although propositional speech had been prepared beforehand as in A, the unexpected change in the stimulus for manual responses resulted in very marked interference with speech. This is proof that ambiguous stimuli can interfere with speech even though they are not stimuli which are correlated with speech production. As noted previously, it should be observed that speech requirements were the same for all procedures; the changes in stimulus conditions were only concerned with finger movements. This was true for B, as well as C, D, and E, except that under these latter conditions speech was performed under threat of shock. Thus, since a new sentence was composed for each trial, the significant speech disorganization found in Blocks C, D, and E were not produced by the conditioning of specific 'word' difficulty, but by threat of penalty.

Although there are probably many more conditions that produce disorganization, the present study has shown that three can produce nonfluency in the adult individual. These include two unfavorable stimulus conditions—(1) presentation of extremely complex stimuli, and (2) presentation of ambiguous stimuli—and one situational condition in which behavior occurred under threat of penalty.

The increase in speech disorganization found in C, D, and E, over that found in A was the result of the third type of condition. The writer interprets this increase to be due to the effects of anxiety. It would seem reasonable to assume that the short term conditioning procedure of Block X produced unfavorable anticipatory reactions (anxiety) in subsequent trials which interfered with the desired performance. In support of this reasoning, it was found that significant increases occurred in the subject's non-specific tension levels; obtained measures of muscular action potentials paralleled quite closely the measures of disorganization. In view of the experimental procedure, these muscular changes were considered to be affective reactions that were induced by shock and subsequent expectation of shock. The reactions were correlated with the stimulus situation, and since they were conditioned, they were anticipatory to shock in Blocks C, D, and E.

The statements concerning unfavorable anticipatory reactions are also strongly supported by the presence of significant adaptation, or experimental extinction, of manual and speech disorganization and non-specific muscle activities, which occurred from C to E. Thus, if the experimental procedure, the increase in disorganization and action potentials, and the clinical observations can be considered indirect evidence, there were strong indications that anxiety or affective involvement under these conditions

produced the increase in disorganization found in C, D, and E.

The present study, based on an hypothesis of stimulus-response disorganization, was chiefly concerned with speech interruptions that the writer believes exhibited great similarity to what Johnson has termed *non-fluency* (*17*), and Van Riper, *primary stuttering* (*36*). The data show that interruptions can occur under unfavorable circumstances in adults, and they suggest that much non-fluency is secondary to unfavorable affective anticipatory reactions. The incorporation of disorganized speech reactions into an individual's everyday behavior, however, would probably require learning or circumstances similar to conditioning.

As indicated in Results, the high degree of organismic involvement found under conditions C, D, and E, in which unfavorable anticipation occurred, was not found under B where there was no anticipation of penalty. This suggests that the type of non-fluency found in B, frequently complete stopping, would not as easily become an integral part of an individual's speech behavior as that found in C, D, and E. The procedure used, the disorganization values, the muscular action potential measures, and clinical observations suggest strongly to the writer that if the conditioning procedure of X, with subsequent unreinforced trials as in C, D, and E, were repeated for an extended period, speech interruptions such as occurred under those conditions would become an integral part of an individual's behavior.

No attempt will be made here to present a systematic position on learning or conditioning in the acquisition of stuttering behavior; this has been attempted by other investigators (*7, 32, 37, 38, 39*). Nevertheless, in keeping with the principles stated previously, the sequence as seen by the writer is as follows:

1. Anxiety is produced by authoritarian situations in which speech is required or demanded.
2. The anxiety which thus accompanies speech produces response disorganization (The occurrence of non-fluency would appear to be closely related to the relative strengths of speech and anxiety responses).
3. Disorganized speech responses, being unacceptable social behavior, are directly or indirectly penalized (*2, 25*).
4. By means of learning or conditioning unfavorable anticipation follows (3) above and self-criticism occurs (*35*).
5. Unsuccessful attempts to avoid or control the unacceptable behavior increase the anxiety and the complexity of the stuttering (*34*).
6. The vicious cycle of circumstances partly described by Van Riper (*36*), Johnson (*17*), Wischner (*39*), Sheehan (*32*), and others, maintains the undesirable behavior through traumatic avoidance learning.

Summary and Conclusions

Disorganization of behavior was investigated by recording speech and manual responses under threat of penalty. During a pre-test situation 30 normal speaking subjects learned to execute three responses simultaneously when certain stimuli appeared. Particular right- and left-hand responses and propositional speech were recorded (1) in a control series, (2) following the application of ambiguous stimuli, and (3) in three experimental series subsequent to a modified light-shock conditioning procedure.

Disorganization of behavior was scaled according to criteria established upon the findings of the present study and previous experiments. Disorganization of speech and of the responses

of each hand were categorized separately according to a four-point scale (0, 1, 2, 3), 3 representing the greatest disturbance.

In general, disorganization of speech and manual responses followed the same course. Although speech requirements were the same for both control and experimental procedures, the introduction of ambiguous stimuli for manual responses produced disorganization of speech behavior. The threat of penalty, produced by means of the interpolated conditioning procedure, resulted in very significant disorganization of speech in all subsequent trials.

The significant increase in disorganization which followed the conditioning trials was assumed to accompany unfavorable affective anticipatory reactions (anxiety) which were produced by threat of penalty. Supportive evidence for this statement was found in the experimental design, recordings of muscle action potentials, the form of the curves, and in the presence of an adaptation effect.

References

1. Atkinson, C. J. Adaptation to delayed side-tone. *JSHD*, 18, 1953, 386-391.
2. Bloodstein, O., W. Jaeger and J. Tureen. A study of the diagnosis of stuttering by parents of stutterers and non-stutterers. *JSHD*, 17, 1952, 308-315.
3. Bonnett, C. *Etude Critique sur morbide du Begaiement Avec Tics et les Cramps Fonctionelles*. Bordeau, 1906.
4. Davis, R. C. The relation of muscle action potentials to difficulty and frustration. *J. exp. Psychol.*, 23, 1938, 141-158.
5. Glasner, P. J. and F. D. Vermilyea. An investigation of the definition and use of the diagnosis, 'primary stuttering.' *JSHD*, 18, 1953, 161-167.
6. Goldstein, K. *The Organism*. New York: American Book Co., 1939.
7. Goss, A. E. Stuttering and anxiety theory: 1. Stuttering behavior and anxiety as a function of the duration of stimulus words. *J. abnorm. soc. Psychol.*, 47, 1952, 38-50.
8. Hale, L. L. A consideration of thiamine supplement in prevention of stuttering in preschool children. *JSHD*, 16, 1951, 327-333.
9. Hill, H. E. Behavioral, electromyographic, and electroencephalographic investigations of response disorganization. Ph.D. Dissertation, Indiana Univ., 1948.
10. ———. Certain correlations beween response disorganization and electrophysiological measures. (To be published)
11. ———. Emotion: Failure of a stimulus-response coordination. In Pronko, N. H. and J. W. Bowles, Jr., *Empirical Foundations of Psychology*. New York: Rinehart, 1951.
12. ———. An interbehavioral analysis of several aspects of stuttering. *J. gen. Psychol.*, 32, 1945, 289-316.
13. ———. Perseveration in normal speakers and stutterers. M.A. Thesis, Indiana Univ., 1939.
14. ———. Stuttering: I. A critical review and evaluation of biochemical investigations. II. A review and integration of physiological data. *JSD*, 9, 1944, 245-261, 289-324.
15. Hill, H. E. and R. E. Belleville. Some effects of chronic barbiturate intoxication on motivation and muscular coordination. *Arch. neurol. Psychiat.*, 70, 1953, 180-188.
16. Howard, D. T. A functional theory of emotions. In Reymert, M. L. (Ed.). *The Wittenberg Symposium: Feelings and Emotions*. Worchester: Clark Univ. Press, 1928.
17. Johnson, W. *People in Quandaries*. New York: Harper, 1946.
18. ———. The role of evaluation in stuttering behavior. *JSD*, 3, 1938, 85-89.
19. Kantor, J. R. *A Survey of the Science of Psychology*. Bloomington, Ind.; Principia Press, 1933.
20. ———. Toward a scientific analysis of motivation. *Psychol. Record*, 5, 1942, 225-275.
21. Lee, B. S. Artificial stutter. *JSHD*, 16, 1951, 53-55.
22. ———. Effects of delayed feedback. *J. acoust. Soc. Amer.*, 22, 1950, 824-826.
23. ———. Some effects of side-tone delay. *J. acoust. Soc. Amer.*, 22, 1950, 639-640.

24. Luria, A. R. *The Nature of Human Conflict.* (Trans. by W. H. Gantt) New York: Liveright, 1932.
25. Moncur, J. P. Parental domination in stuttering. *JSHD*, 17, 1952, 155-165.
26. Muenzinger, K. F. and F. C. Walz. An examination of electrical-current-stabilizing devices for psychological experiments. *J. genet. Psychol.*, 10, 1934, 153-195.
27. Murray, H. *Explorations in Personality.* New York: Oxford Univ. Press, 1938.
28. Patrick, J. R. Studies in rational behavior and emotional excitement. II. The effect of emotional excitement on rational behavior in human subjects. *J. comp. Psychol.*, 18, 1934, 153-175.
29. Pavlov, I. P. *Conditioned Reflexes: An Investigation of the Physiological Activities of the Cerebral Cortex.* (Trans. by G. V. Anrep) London: Oxford Univ. Press, 1927.
30. Peters, C. C. and W. R. Van Voorhis. *Statistical Procedures and Their Mathematical Bases.* New York: McGraw-Hill, 1940.
31. Sears, R. R. and C. I. Hovland. Experiments on motor conflict: II. Determination of mode of resolution of comparative strengths of conflicting responses. *J. exp. Psychol.*, 28, 1941, 280-286.
32. Sheehan, J. G. The modification of stuttering through non-reinforcement. *J. abnorm. soc. Psychol.*, 46, 1951, 51-63.
33. Stone, R. The spread effect of negative incentives in a modified Thorndikian situation. Ph.D. Thesis, Indiana Univ., 1946.
34. Van Riper, C. The effect of penalty upon frequency of stuttering spasms. *J. genet. Psychol.*, 50, 1937, 193-195.
35. ———. The growth of the stuttering spasm. *Quart. J. Speech*, 23, 1937, 193-195.
36. ———. *Speech Correction: Principles and Methods.* (2nd ed.) New York: Prentice-Hall, 1947.
37. Wischner, G. J. An experimental approach to expectancy and anxiety in stuttering behavior. *JSHD*, 17, 1952, 139-154.
38. ———. An experimental approach to stuttering as learned behavior. *Amer. Psychologist*, 3, 1948, 278-279.
39. ———. Stuttering and learning: a preliminary theoretical formulation. *JSHD*, 15, 1950, 335-345.
40. Young, P. T. Studies in affective psychology. *Amer. J. Psychol.*, 40, 1928, 372-400.

Store Clerks' Reaction To Stuttering

Eugene T. McDonald

James V. Frick

CLINICAL interviews with stutterers reveal that frequently their speech is influenced by what they think are the reactions of their audience. Often, stutterers base these judgments concerning their listener's reactions on inferences or on stereotyped notions which have developed from an unpleasant experience. Another factor is that the stutterer will frequently project his own feelings about his stuttering in such a way that, if he is experiencing feelings of shame, embarrassment, self-pity, etc., he will tend to perceive these same feelings in his listener. He will be quick to interpret the most innocent action or remark of his listener as being evidence for what are really his own feelings. Sometimes, his listener will be obviously disturbed but, more often than not, nothing in the way of a negative reaction will be noticed by an objective observer.

Such evaluations, of course, reveal next to nothing concerning the actual feelings of listeners to whom the stuttering person speaks. The aim of the present study was to determine how one group of listeners—store clerks—feels while talking with a stutterer. Such a group was chosen because (1) it was felt that store clerks would be much more representative of the general public than the type of person usually used in studies of this nature, e.g., majors in speech correction, students in an introductory speech course, etc., and (2) store clerks are often talked to by stutterers in the assignments and situation work which play such a large part in therapy for stutterers at most speech clinics.

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Procedure

A list of probable reactions was obtained by asking the students in a beginning speech correction class and a public speaking class to listen to a three-minute speech by a stutterer and then write a description of how they felt during the speech. The descriptions submitted by the 30 students in these two classes were classified into eight categories by one of the authors according to the attitude or feeling expressed. These categories were surprise, embarrassment, impatience, pity, amusement, curiosity, sympathy, and repulsion. Questions which interrogated concerning these reactions were formulated. To these questions were added others based on the statements made by stutterers about their evaluations of listener's reactions. The wording of each item was revised by a specialist in market

TABLE 1. Judges' classification of the questionnaire items.

	Surprise	*Embarrassment*	*Impatience*	*Pity*	*Amusement*	*Curiosity*	*Sympathy*	*Repulsion*	*Unclassified*
Surprise									
1. Were you startled by his manner of speaking?	20								
2. Were you shocked when he began to have trouble?	12	4		3					
3. Did his speech throw you off guard, that is, did it catch you unawares?	18	1							
Embarrassment									
4. Were you nervous while he was talking to you?		15	2					3	
5. Were you confused or puzzled when he was talking to you?	1	10				3			6
6. While he was talking, did you wonder about what you should do or say?		12				2	2		4
7. Did you wish he had spoken to some other person?		14	1					5	
Impatience									
8. Did you wish he would hurry up and get finished?		3	17						
9. Did you feel like telling him to say what he had to say and get it over with?			19					1	
Pity									
10. Did you think about how lucky you were not to talk like that?				10			5		5
11. Did you think of how unfortunate he is to have this defect?				19			1		
12. Did you think he might be better off to be hard of hearing or have some other defect than to talk like this?				13			2	1	4
Amusement									
13. At the time, were you amused by the way he spoke?					19	1			
14. Did you feel like laughing when he was talking?					18	2			
15. Were you reminded of movie cartoons where people talk like him?	1				18				1
Curiosity									
16. Would you have liked to ask him some questions about his speech difficulty?						13	5		2
17. Did you wonder about what kind of a person he was?			1			17			2
18. Did you wonder about what made him talk that way?						20			
Sympathy									
19. Did you think about how you would feel if you talked like him?						2	16		2
20. Did you think about how he must have felt about his trouble?				2		2	15		1
Repulsion									
21. Did you feel like walking away from him?		2	2	2				14	
22. Did you feel like telling him to go away?		1	6					13	
23. Were you disgusted with him?			3					17	
Unclassified									
24. Did you look at him after he started to have difficulty with his speech?		8		1		4	1	1	5
25. When he had trouble saying a word, did you feel like saying it for him?		1	7		4		8		

research interviewing and a questionnaire of 25 items constructed.

Two graduate students in clinical speech were instructed in the use of the questionnaire and in interviewing technique. The questionnaire and the interview procedure were pre-tested by having a stutterer enter a store and stutter severely while asking the clerk an appropriate question. Immediately upon the stutterer's completing his conversation with the clerk, the interviewer, who had been waiting inconspicuously nearby, would open the interview by approaching the clerk and saying in a casual way, 'Say, what was wrong with that fellow?' (This question was not one of the 25 questionnaire items but was asked to determine how many of the clerks would identify the behavior as defective speech.) Noting the clerk's response the interviewer continued, 'Well, you know he was a student from the Penn State Speech and Hearing Clinic. We are conducting a study to determine how people feel when talking to persons who have speech defects. The results of this study will be used in helping these persons overcome their difficulty.' At this point, the clerk was asked if he (or she) had ever talked before with anyone who spoke like this. After noting the clerk's response, the questionnaire items were asked and all comments, hesitations, and apparent confusions noted. When the questions were all put to the clerk, the interviewer explained that this was a 'trial run' and asked the clerk to identify any questions which were not clear in meaning. Five such interviews were conducted and the confusing questions clarified. A final classification of the 25 items was then made by having 20 judges assign them to the categories mentioned above according to the feelings with which they were concerned. These judges were selected from graduate students, secretaries, student wives and faculty members in speech and psychology. Table 1 shows the judges' classification of the questionnaire items. An item is shown under a specific category if at least half of the judges agreed that it was directed toward that feeling. It will be noted that all but two of the items (Questions 24 and 25) met this criterion.

Appropriate questions were prepared for the stutterers to ask the clerks in the following types of business places: drug stores, jewelry stores, men's clothing stores, furniture stores, shoe stores, hardware stores, five-and-ten-cent stores and hotels. A total of 50 clerks (28 men and 22 women) were interviewed in three towns. Two severe adult male stutterers, who had learned to reproduce their blocks realistically, were instructed to block overtly when talking to the clerk. The interviewer observed the stutterer's performance and noted the amount of difficulty in each situation. A high degree of consistency in the severity of stuttering throughout all the interviews was reported.

Results

In replying to the question, 'Say, what was wrong with that fellow?', 22 clerks used the word 'stuttering' or 'stammering' and seven more did not use these words but mentioned 'speech defect' in some way; thus, 58% identified the difficulty as a speech problem. Fifteen clerks said they did not know what was wrong with the speaker. Three made emotional responses such as, 'My God, wasn't that awful!' and another three described the difficulty in terms of a

TABLE 2. Clerks' responses to the questionnaire items.

	Yes	*No*	*Don't Know*
Surprise			
1	18	30	2
2	15	33	2
3	29	21	
Embarrassment			
4	10	40	
5	16	33	1
6	17	32	1
7	3	45	2
Impatience			
8	8	42	
9	4	46	
Pity			
10	39	10	1
11	44	6	
12	2	40	8
Amusement			
13	3	47	
14		49	1
15	6	42	2
Curiosity			
16	9	37	4
17	17	29	4
18	30	16	4
Sympathy			
19	25	21	4
20	17	29	4
Repulsion			
21	1	49	
22		49	1
23		50	
Unclassified			
24	26	22	2
25	33	16	1

'nervous' disorder. To the other general question, 'Have you ever talked before with anyone who spoke like this?', 40 of the clerks answered 'Yes' and 10 answered 'No.'

The responses of the clerks to the questionnaire items are shown in Table 2, where the items are listed in the same order as in Table 1 so that the reader may refer to the latter for the wording of any item. A detailed analysis of these data will not be attempted; rather, an indication of what seem to be their more outstanding aspects will be given. First of all, the great majority of the clerks gave negative responses for the three categories of impatience, amusement and repulsion. On the other hand, a clear cut preponderance of affirmative responses is found for only one category, that of pity, but it is interesting to note that (Question 12) the clerks did not feel that the stutterer ' . . . might be better off to be hard of hearing or have some other defect . . . '

While the data for the other five categories are not patterned so neatly, they do tend to fall more in one direction or another. The responses to the first two items under Surprise are mostly 'No' while a slight majority answered 'Yes' to Question 3. About two-thirds of the clerks answered 'No' or 'Don't Know' to the four

TABLE 3. Summary of responses in feeling categories.*

	'Yes' to all	*'Yes' to at least 1*	*'No' to all*	*'Don't Know' to all*
Surprise (3)	9	32	18	0
Embarrassment (4)	0	26	22	2
Impatience (2)	1	11	39	0
Pity (3)	2	47	3	0
Amusement (3)	0	11	39	0
Curiosity (3)	4	36	14	0
Sympathy (2)	21	42	8	0
Repulsion (3)	0	1	49	0

*Each entry in Column 2 is a total of (1) the number of clerks who answered 'Yes' to all items and (2) the number of clerks who answered 'Yes' to at least one item but not to all items. For example, the number 32 in this column for Surprise represents the nine clerks who answered 'Yes' to all items in this category and the 23 clerks who answered 'Yes' to at least one, but not all, items in this category.

items under Embarrassment. For Curiosity, again approximately two-thirds failed to give affirmative responses for Questions 16 and 17 but 30 clerks 'did wonder about what made him talk that way' (Question 18). Under Sympathy, some two-thirds answered 'No' or 'Don't Know' to Question 20 but, in Question 19, the combined 'No' and 'Don't Know' responses are equal to the 'Yes' responses. Finally, the preponderance of 'Yes' responses to Question 25 confirms the frequently noted fact that many people want to say the word for the stutterer when he is having trouble.

Table 3 presents the number of clerks answering 'Yes' to all items, 'Yes' to at least one item, 'No' to all items, and 'Don't Know' to all items in each of the eight main categories. The number in parentheses next to the category name gives the number of items under that heading. It is again evident from only a cursory inspection that relatively few clerks reported feelings of impatience, amusement or repulsion, especially the latter. When the other five categories are considered, however, such general statements are not so readily made because the data here are much less clear cut. If the figures in Column 1 are considered ('Yes' to all), it seems that very few clerks reported feelings under these five categories with the possible exception of Sympathy; on the other hand, the entries in Column 2 ('Yes' to at least 1) for these categories point to a different conclusion: that, at least to some extent, the majority of the clerks experienced the particular feelings.

Discussion

The data seem to warrant the generalization that the stutterer will encounter unfavorable forces such as impatience, amusement, and repulsion only rarely. His listener will react with feelings of pity and sympathy fairly often, however, while reactions of curiosity, surprise and embarrassment should not be unexpected. While these latter five feelings are not so obviously unfavorable as the first three might be, therapists frequently note that a stutterer will be just as disturbed by an oversympathetic old lady or the embarrassed relatives of his future bride as he will be by the clerk in the five-and-ten who refuses to wait on him. It would seem that any program for stutterers, then, should work rapidly to reduce the overt symptoms since the listener does appear to react to pattern complexity. At the same time, therapy should help the stutterer to remain objective in the presence of such listener feelings. Early in therapy, too, the stutterer should be helped to recognize and remove his tendency to project his own feelings because this study shows that the store clerks were not at all unanimous in giving unfavorable responses to the questionnaire items. Situation work is particularly effective for learning to eliminate these projections. Clinical discussion is valuable but permanent changes in behavior and attitudes are accelerated by frequent opportunities to test reality, that is, how many of his listeners do seem to experience feelings of impatience, pity, etc.?

A second important finding is that 21 of the 50 clerks did not recognize the stutterer's behavior as a speech problem; this seems especially significant when we remember that 40 of the clerks said they had talked before 'with someone who spoke like this.' Evidently, there is still a great need for a program of public education concerning the problem of stuttering.

Summary

A questionnaire of 25 items divided into eight feeling categories was administered to 50 store clerks to determine their feelings immediately after having been asked a question by a severe stutterer. The data indicate that feelings of impatience, amusement and repulsion will be encountered only rarely by the stutterer while feelings of surprise, embarrassment, pity, curiosity and sympathy will be experienced by the listener with varying degrees of frequency. Implications for stuttering therapy were discussed and the importance of a continuing program of public education was emphasized.

The Merits Of Backward Playing Of Connected Speech In The Scaling Of Voice Quality Disorders

Dorothy Sherman

EXPERIMENTAL studies of voice quality disorders require measures of degree of severity which are both reliable and valid. Scaled values of harsh voice quality obtained through the use of psychological rating-scale procedures have been found to be satisfactorily reliable (*4*). The validity of the measures was unknown.

Further information is needed on the reliability of voice quality scales, and the problem of validity should be thoroughly investigated. Judgments of voice quality in connected speech are probably particularly influenced by the halo effect. Contamination of judgements by irrelevant factors is to be expected. Among possible irrelevant factors are pitch usage, articulation, effectiveness in conveying meaning, cues associated with particular disorders of voice, etc.

Results obtained by Buck (*1*) cast doubt on the validity of ratings of nasality. His raters reported difficulty in judging the nasal quality of the voice during vowel productions as an attribute distinct from the other deviant characteristics of cleft palate speech, such as poor articulation. An evaluation of his results demonstrated a strong tendency toward low ratings on any sample of speech which deviated markedly from normal, whether the deviation was one of voice quality or articulation or some other characteristic of the speech. Ratings of voice quality obtained by psychological scaling of speech samples may thus represent, at least in part, a scale of general effectiveness of speech rather than a strict scale of voice quality.

The purpose of the present study is to evaluate the method of obtaining scale values of severity of harshness and of nasality with recorded speech stimuli played backwards. Playing the speech samples backwards should eliminate most of the irrelevant factors which might influence observers. Evaluation of the usefulness of measures obtained in this way required investigation of both reliability and validity.

Equipment

A high fidelity tape recorder, Presto, Model RC 10/24, was used for recording the speech samples. The tapes were recorded at a speed of 15 inches per second. The recording microphone was an Electro Voice, Model 650.

The instrumentation for the listening sessions consisted of (1) the Presto RC 10/24 tape playback, (2)

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a T-pad, 500-ohm input, 600-ohm output, (3) a McIntosh amplifier, Model 20W2, and (4) a Permoflux 15-inch Coronet loudspeaker in a bass-reflex enclosure.

The recording microphone and the loudspeaker were located in a sound-isolated room. All other equipment was in an adjacent room.

Procedure

Test Items for Scaling. Material for the scaling of harshness consisted of the six passages constructed by Sherman and Linke (*4*) for a study of the influence of certain vowel types on degree of harsh voice quality. The vowel content of each passage was controlled and belonged predominantly to one of the following vowel categories: front, back, high (or short), low (or long), tense, and lax. These passages, read by 15 male clinically-diagnosed harsh voices, had been scaled by the method of equal-appearing intervals on a seven-point scale by a group of 35 observers. The original recorded test tapes with the 90 speech samples arranged in random order were available for further experimentation.

Four reading passages and an assigned topic for conversational speech were employed to obtain from 10 female and 14 male clinically-diagnosed nasal voices speech samples to be scaled for degree of severity of nasality. Materials were selected or constructed to provide for predictions concerning expected variation among passages in degree of perceived nasality. Two passages, one containing 18 and the other 19 nasal consonants, were selected from one paragraph of reading material. The prediction was that mean scale values for these two selections should not be significantly different and that, if either differed significantly from a third selection, the other should also. Two passages were constructed which might be expected to differ in degree of perceived nasality. One contained no nasal consonants; the other contained 34 nasal consonants. The assumption that the resultant scale values for these passages would differ was based upon the frequent clinical observation of assimilated nasality. No definite prediction was made with respect to the conversational speech passage. This passage was included because of the possibility that degree of nasality may be related to the type of speaking situation (*2*).

All passages required approximately 30 seconds for oral presentation.

Preparation of Recorded Test Tapes. Tape recordings of the nasal voices were prepared for scaling with the samples played forwards by assembling the 120 samples, five passages for each of 24 voices, in random order. One restriction was placed on the randomization. No two samples for any one voice were placed adjacent to each other. To prepare the tapes for playing backwards, they were cut and spliced to preserve the originally determined random order. The same procedure was followed with the 90 samples of harsh quality, six passages for each of 15 voices.

Scaling the Samples. The speech samples were judged by seniors and graduate students in speech pathology, all of whom had had some training in diagnosis of voice disorders and none of whom was familiar with the purposes or the nature of the study. They listened under essentially free field conditions.

Presented first at each listening session were tape-recorded readings by each of several voices representing the range of severity of the samples to be judged.

Four sets of scale values were obtained from the judgmental responses of four different groups with from 30 to 35 listeners in each group. Each of the two sets of speech samples, 90 for harsh voice quality and 120 for nasal voice quality, was scaled twice, once with the samples presented forwards and once with the samples presented backwards. The samples were scaled through an application of the method of equal-appearing intervals employing a seven-point scale extending from *one*, for least severe harshness or nasality, to *seven*, for most severe harshness or nasality. Median scale values and *Q*-values were obtained in the way described by Thurstone and Chave (*5*).

Results and Discussion

Reliability of Scale Values. Scale values for the harsh speech samples presented forwards had previously been shown to be fairly reliable (*4*). For the scale values obtained for the harsh speech samples presented backwards, *Q*-values, which measure the dispersion of judgments, were also satisfactorily small with a mean of .79 as compared with a mean of .77 for the samples presented forwards. The slight increase of .02 in the mean *Q*-value is of no practical significance and is readily accounted for by the fact that, when the samples were played backwards, scale values for three voices shifted away from the extreme low end of the continuum representing least severe harshness. The end-effect, which results in low *Q*-values, was thus no longer operating for these three voices.

The mean Q-value of the set of scale values obtained for the nasality samples presented backwards was .97 as compared with .81 for the same samples presented forwards. The difference of .16 was significant beyond the one per cent level.[1] Although the difference is significant, it is fairly small and does not indicate any marked difference in reliability. A plausible explanation of the obtained difference is that the observers who rated the samples played forwards had had on the average more experience in diagnosing and judging severity of voice quality disorders.

TABLE 1. Comparisons of the scale values of 24 nasal voices for Passage 1 and Passage 2 from the same paragraph, obtained by Method A, from judgments on samples played forwards, and by Method B, from judgments on samples played backwards.

	Mean	*Dif.*	*S. E.*$_{dif.}$	t*	r
1–A	3.69				
2–A	3.84	.15	.13	1.154	.89
1–B	3.58				
2–B	3.72	.14	.16	.875	.89

*$t_{.05}$ (df = 23) = 2.069

More favorable evidence of comparable reliability for the two sets of scale values for the nasality samples was obtained from the results of a correlation procedure. The prediction could be made with reasonable certainty that scale values for any one voice for the two speech samples from the same reading passage, if reliable, should be approximately equal. The correlation between the two sets of scale values for the two speech samples from the same passage would thus provide a measure of reliability. Table 1 presents the results obtained

[1] $t = G.M. / (ms_v / N)^{1/2} = 5.16$, where: $G.M.$ = general mean of a passages × voices analysis of variance table employing differences between corresponding *Q*-values as criterion measures = .16; N = number of criterion measures = 120; $t_{.01}$ (df=23) = 2.807.

by employing Pearson's correlation procedure along with a test of the differences between the means of the scale values derived from judgments of the samples played forwards and also from judgments of the samples played backwards. Pearson r's of the same value, .89, and the lack of significance for differences between means, are strong evidence that scale values derived from judgments obtained by the two methods are about equally reliable.

Validity of Scale Values. Any advantage to be gained by employing the method of backward playing of speech samples to be judged for voice quality is dependent upon the question of validity. As previously mentioned, contamination of judgments by irrelevant factors, when samples are played forwards, makes doubtful the meaning of obtained scale values.

To test for significant differences among means based on the scale values obtained with each of the two methods of presenting passages, an analysis of variance classified by Lindquist (*3*) as a treatments by subjects design was employed. In this case the design is passages (P) by voices (V).

Nasality Scale Values. Results of analyses of the data obtained for the nasal speech samples are presented in Table 2. That there were differences among passages in the degree of perceived nasality when the samples were presented either forwards or backwards is indicated by the significant results of the F-tests.[2] The main interest, however, is in whether the two methods of presentation of the passages result in significant differences between the same pairs of passages. If the results from the two methods are not alike in this respect, then the set of scale values more closely in accordance with the predictions made in selecting the passages may be assumed to be more valid than the other.

Specific predictions made were as follows: (1) The mean scale values for the two passages from the same paragraph of reading material should not differ significantly; (2) the mean scale values for the two passages from the same paragraph of reading material should differ in the same way from the mean scale value for any one of the remaining three passages; and (3) the mean scale values for the two passages from the same paragraph of reading material and also the passage from spontaneous speech should be significantly larger than the mean scale value for the passage containing no nasal consonants and significantly smaller than the mean scale value for the passage loaded with nasal consonants.

TABLE 2. Summaries of analyses of variance, testing differences among mean scale values of severity of nasality obtained for five passages read by 24 nasal voices and judged by two groups of trained observers employing Method A, with judgments of samples played forwards, and Method B, with judgments of samples played backwards.

Source of Variation	*df*	*ss*	*ms*	*F*
Method A				
Passages (P)	4	18.514	4.629	22.58*
Voices (V)	23	151.763	6.598	
$P \times V$	92	18.843	.205	
Total	119	189.120		
Method B				
Passages (P)	4	37.832	9.458	30.81*
Voices (V)	23	91.247	3.967	
$P \times V$	92	28.206	.307	
Total	119	157.285		

*$F = ms_P / ms_{P \times V}$. F, 4 and 92 df, 5% level of confidence, 2.48.

[2]The level of significance selected for all tests in this study was five per cent.

TABLE 3. Differences among obtained mean scale values of severity of nasality for five passages read by 24 nasal voices and judged by two groups of trained observers employing Method A, with judgments on samples played forwards, and Method B, with judgments on samples played backwards.

Passage*	Method	Passage 2	3	4	5	Mean Scale Value
1	A	.15	.81†	.33†	.14	3.69
	B	.14	.41†	1.29†	.22	3.58
2	A		.96†	.18	.29†	3.84
	B		.55†	1.15†	.08	3.72
3	A			1.14†	.67†	2.88
	B			1.70†	.63†	3.17
4	A				.47†	4.02
	B				1.07†	4.87
Mean Scale Value	A	3.84	2.88	4.02	3.55	
	B	3.72	3.17	4.87	3.80	

*Passages are identified as follows: 1 and 2, from the same paragraph of reading material with occurrence of nasal consonants balanced (18 and 19, respectively); 3, with no nasal consonants; 4, with many nasal consonants (34); 5, from spontaneous speech. The entry in each cell corresponding to two passages and either Method A or Method B is the difference between the mean scale values indicated in the margins of the table.

†Significant at the five per cent level of confidence. For Method A the required difference at this level is .27, for Method B, .33.

Differences among obtained mean scale values for the five passages for both methods of playing the samples are given in Table 3. For either method the resultant means rank in order satisfactorily in accordance with the original predictions. The spread of the means along the continuum of severity, however, is greater for the means obtained from judgments of the samples played backwards. This seems to indicate that differences among passages in perceived nasality were more obvious by this method. The distances are 1.70 and 1.14, respectively, with a difference of .56 scale value.

The passage loaded with nasal consonants was judged as relatively more severely nasal in comparison to any other passage when the samples were played backwards; and the passage containing no nasal consonants was judged, in general,[3] as relatively less severely nasal when the samples were played backwards (See Table 3). A possible explanation for these relative differences between the two methods in placing the passages on the scale of severity could be that irrelevant factors had more influence on judgments of the samples played forwards. Effectiveness of presentation of passages, for example, might vary with changes in reading difficulty from passage to passage. Knowledge of the lack of any nasal consonants in a passage or of the loading of a passage with nasal consonants might also importantly influence judgments. Cognizance of this factor was not possible when the samples were played backwards. Observers had all had training in the area of voice disorders and were aware of the fact that more nasality is expected on vowels adjacent to nasal consonants. This awareness might reasonably be expected to influence the observers toward more

[3]The differences between the mean scale values for the passage containing no nasal consonants and the passage loaded with nasal consonants, 1.70 with backward playing and 1.14 with forward playing, do not necessarily constitute an exception. The tendency to judge the passage loaded with nasal consonants as relatively more severely nasal with the samples played backwards was consistent. Evidently this tendency was stronger than the tendency to judge the passage with no nasal consonants as relatively less severely nasal with the samples played backwards.

severe ratings on the passage for which relatively less severe nasality might be expected and toward less severe ratings on the passage for which relatively more severe nasality might be expected.

Several discrepancies between the predictions made and the obtained differences among mean scale values for passages occur with the results from judgments of samples played forwards. As shown in Table 3, for results by this method, the differences between the mean scale value for the passage loaded with nasal consonants and the mean scale values for the two passages from the same paragraph of reading material are respectively .33, significant, and .18, non-significant. The prediction was that the two passages from the same paragraph of reading material should differ in the same way from any other passage and, in this instance, that both should be significant. A discrepancy also occurs for the differences between the mean scale value of the spontaneous speech passage and the mean scale values of the two passages from the same paragraph of reading material, the differences being respectively .14, non-significant, and .29, significant. These discrepancies do not occur with the results from judgments of the samples played backwards. In both instances the disagreements between results from the two methods are for the second of the two passages from the same paragraph. The only apparent explanation is that irrelevant cues had more influence on the judgments of the second of the similar passages when the samples were played forwards. There were no discrepancies between the predictions and the results obtained with the samples played backwards.

The conclusion that scale values of severity of nasality obtained from judgments of speech samples played backwards are more valid than scale values obtained when the samples are played forwards seems warranted.

TABLE 4. Summary of analysis of variance, testing differences among mean scale values of severity of harshness obtained for six passages read by 15 harsh voices and judged by a group of trained observers with judgments on samples played backwards.

Source of Variation	*df*	*ss*	*ms*	*F*
Passages (*P*)	5	11.457	2.291	9.31*
Voices (*V*)	14	113.392	8.099	
$P \times V$	70	17.236	.246	
Total	89	142.085		

*$F = ms_P / ms_{P \times V}$. *F*, 5 and 70 *df*, 5% level of confidence, 2.36.

Harshness Scale Values. Significant differences among mean scale values of severity for the six passages read by 15 harsh voices had been obtained in a previous experiment (*4*) with the samples played forwards. As indicated by the result of the *F*-test given in Table 4, significant differences were obtained also from judgments with the samples played backwards.

Differences among mean scale values for the six passages for each of the two methods of presenting the samples are given in Table 5. The spread of the means along the continuum of severity of harshness is greater for the means obtained from judgments of samples played backwards. The distances are 1.21 and .84 scale values, respectively, with a difference of .37. The direction of difference is in agreement with results for the nasality passages and provides further evidence to support the hypothesis that differences are more obvious when the samples are played backwards.

For the two methods of presentation of the samples, nine of the 15

TABLE 5. Differences among obtained mean scale values of severity of harshness for six passages read by 15 harsh voices and judged by two groups of trained observers employing Method A, with judgments on samples played forwards, and Method B, with judgments on samples played backwards.

*Passage**	*Method*	*Passage* 2	3	4	5	6	*Mean Scale Value*
1	A	.21	.10	.56†	.74†	.29†	3.30
	B	.09	.72†	.49†	.03	.05	4.22
2	A		.31†	.35†	.53†	.08	3.51
	B		.81†	.40†	.12	.04	4.31
3	A			.66†	.84†	.39†	3.20
	B			1.21†	.69†	.77†	3.50
4	A				.18	.27†	3.86
	B				.52†	.44†	4.71
5	A					.45†	4.04
	B					.08	4.19
Mean Scale Value	A	3.51	3.20	3.86	4.04	3.59	
	B	4.31	3.50	4.71	4.19	4.27	

*Passages were loaded by certain vowel types and are identified as follows: 1, front vowels; 2, back vowels; 3, high (or short) vowels; 4, low (or long) vowels; 5, tense vowels; 6, lax vowels. The entry in each cell corresponding to two passages and either Method A or Method B is the difference between the mean scale values indicated in the margins of the table.

†Significant at the five per cent level of confidence. For Method A the required difference at this level is .26, for Method B, .36.

differences among passages are in essential agreement. That is, both are non-significant or both are significant and in the same direction. The mean scale values for the passages involved, however, although they rank in order the same* for the two methods, shift in relative position along the scale of severity with change of method. Among the remaining six pairs of differences the disagreement is with respect to both rank order and relative position of the means along the scale of severity. The most pronounced change in results between methods is obviously for the passage loaded with tense vowels. An explanation for this change in particular is needed if any conclusion is to be made concerning relative validity of results from the two methods.

Specific predictions with respect to expected differences among passages could not be made. Evaluation of the relative validity of results for the two methods was thus dependent upon establishing a relationship between the change in results and some factor which reasonably might have influenced judgments for one method only.

Criterion measures of change in results between the two methods

*The reversal of rank order for Passage 2, loaded with back vowels, and Passage 6, loaded with lax vowels, are not considered an exception. The differences for the two methods are small, .08 and .04 of a scale value, both non-significant.

were computed by subtracting each of the 90 scale values obtained with the samples played forwards from the corresponding scale values obtained with the samples played backwards.

As mentioned in previous discussion, general effectiveness in conveying meaning is one factor which might have an irrelevant influence on judgments of samples played forwards. In order that this possibility might be investigated, median scale values for general effectiveness in conveying meaning were obtained for the 90 speech samples. Twelve observers, all of whom were enrolled in a course in voice and articulation disorders, rated the samples for effectiveness on a seven-point scale, with *one* representing most effectiveness and *seven* representing least effectiveness. Observers were instructed to disregard to the best of their ability the influence of voice quality deviation.

Table 6 presents summaries of analyses of variance testing differences among passages for (1) effectiveness and (2) change between methods. The passage means and differences among them for both analyses are given in Table 7. The mean change for passages is toward more severe ratings for all six passages with the method of playing the samples backwards. The changes for the passages loaded with high (or short) vowels and for the passage loaded with tense vowels are significantly smaller than the change for any one of the other four passages. The passage loaded with high (or short) vowels ranks in order as least harsh by both methods but was judged as relatively less harsh when the samples were played backwards. A possible explanation for this change is afforded by the previously discussed hypothesis that differences are more obvious when samples are played backwards. As already mentioned in previous discussion, the most pronounced change in results between methods is that for the passage loaded

TABLE 6. Summaries of analyses of variance, testing differences among means obtained for six passages read by 15 harsh voices for (1) scale values of effectiveness in conveying meaning obtained from judgments by a group of observers and (2) change between scale values of severity of harshness obtained by Method A, with judgments on samples played forwards, and Method B, with judgments on samples played backwards (B – A).

Source of Variation	*df*	*ss*	*ms*	*F*
Effectiveness				
Passages (*P*)	5	4.579	.916	1.47*
Voices (*V*)	14	154.392	11.028	
P × *V*	70	43.640	.623	
Total	89	202.611		
B – A				
Passages (*P*)	5	8.439	1.688	7.67*
Voices (*V*)	14	57.827	4.130	
P × *V*	70	15.415	.220	
Total	89	81.681		

*$F = ms_P / ms_{PxV}$. *F*, 5 and 70 *df*, 5% level of confidence, 2.36.

TABLE 7. Differences among means for six passages read by 15 harsh voices for (1) scale values of effectiveness in conveying meaning obtained from judgments by a group of observers and (2) change between scale values of severity of harshness obtained by Method A, with judgments on samples played forwards, and Method B, with judgments on samples played backwards (B – A).

Passage*		Passage 2	3	4	5	6	Mean
1	Eff.	.12	.14	.20	.64†	.06	3.39
	B – A	.11	.60†	.07	.83†	.23	.91
2	Eff.		.02	.08	.52	.18	3.51
	B – A		.49†	.04	.72†	.12	.80
3	Eff.			.06	.50	.20	3.53
	B – A			.53†	.23	.37†	.31
4	Eff.				.44	.26	3.59
	B – A				.76†	.16	.84
5	Eff.					.70†	4.03
	B – A					.60†	.08
Mean	Eff.	3.51	3.53	3.59	4.03	3.33	
	B – A	.80	.31	.84	.08	.68	

*Passages were loaded by certain vowel types and are identified as follows: 1, front vowels; 2, back vowels; 3, high (or short) vowels; 4, low (or long) vowels; 5, tense vowels; 6, lax vowels. The entry in each cell corresponding to two passages and either effectiveness or change (B – A) is the difference between the means indicated in the margins of the table.

†Significant at the five per cent level. For effectiveness the required difference at this level is .57, for change (B – A), .34.

with tense vowels, ranking as most harsh with the samples played forwards and as second least harsh with the samples played backwards. A possible explanation for the change is the fact that this passage ranked least effective in conveying meaning. Two of the differences between this passage and the other passages are significant.[5]

Other factors not subject to experimental test might also have been related to the change between methods. The type of vowel with which a passage is loaded is more easily recognized when samples are played forwards; and observers might have been biased in their judgments by knowledge of the type of vowel. Another example of the possible operation of an irrelevant cue with the samples played forwards is the fact that incidence of abrupt initiation of the vowel may have varied among passages. Incidence of opportunities for abrupt initiation of the vowel was not controlled in the construction of the passages, the range of such opportunity being from four to 16 with the highest incidence for the passage

[5]The result of the *F*-test to evaluate differences among passages in general effectiveness of conveying meaning, as reported in Table 6, is non-significant. The purpose of the analysis, however, was to provide for computation of the most stable error term to employ in determining the critical difference necessary to establish significance of differences between the passage loaded with tense vowels and the other passages. To employ the *t*-test in this instance was thus assumed to be a reasonable procedure.

loaded with tense vowels. All observers had learned through their course work in voice disorders that abrupt initiation of the vowel is commonly associated with harsh voice quality. They might have been biased toward more severe ratings with higher incidence of abrupt initiation, particularly for the passage loaded with tense vowels.

To evaluate more precisely the relationship between effectiveness of conveying meaning and the change in scale values between methods, three different correlation coefficients were obtained: one for total, based on the criterion measures for the 90 samples, —.57; one for passages, based on the means for the six passages,—.74; and one for voices, based on the means for the 15 voices,—.70. All three r's are significant[6] at or beyond the five per cent level. The significant relationships both for passages and for voices are a clear indication that observers were influenced in their judgments of the samples played forwards by general effectiveness in conveying meaning.

The conclusion that scale values of severity of harshness obtained from judgments of speech samples played backwards are more valid than scale values obtained when the samples are played forwards seems warranted.

Conclusion

Experimental control of a concomitant variable such as general effectiveness in conveying meaning is usually either impossible or impracticable. Statistical control by the method of analysis of covariance is feasible when quantitative measures of the concomitant variable are available. The method of presenting the samples backwards, however, eliminates any necessity for control of at least one such variable, that of general effectiveness in conveying meaning. For certain other kinds of variables, such as changes in phonetic context under study, neither experimental nor statistical control over the operation of irrelevant factors is possible. When judgments of severity of voice quality disorder are obtained with the speech samples played backwards, the influence on observers of some of these irrelevant factors, according to the results of this study, would appear to be eliminated. Although no advantage is to be gained with respect to reliability, the conclusion that this method results in more valid measures of degree of severity of voice quality disorder is warranted.

References

1. Buck, M. W. An X-ray study of cleft palate oral and pharyngeal structures and their functioning during vowel phonation. Ph.D. Dissertation, State Univ. Iowa, 1951.
2. Johnson, W., F. L. Darley and D. C. Spriestersbach. *Diagnostic Manual in Speech Correction.* New York: Harper, 1952.
3. Lindquist, E. F. *Design and Analysis of Experiments in Psychology and Education.* New York: Houghton Mifflin, 1953.
4. Sherman, D. and E. Linke. The influence of certain vowel types on degree of harsh voice quality. *JSHD,* 17, 1952, 401-408.
5. Thurstone, L. L. and E. J. Chave. *The Measurement of Attitude.* Chicago: Univ. of Chicago Press, 1929.

[6] $r_{.01}$ (df = 88) = .24; $r_{.05}$ (df = 4) = .72; $r_{.01}$ (df = 13) = .59. Values given are for a one-tailed test of significance.

Voice Problems Of The Actor And Singer

Friedrich S. Brodnitz

THE VOICE problems of the professional artist constitute a kind of no-man's land which nobody likes to enter. The laryngologists usually lack the training and experience to deal with conditions that are not based on organic disease; the teachers of singing and dramatics know too little about physiology and pathology of the voice; and the speech and voice therapists are, as a rule, not familiar with the working conditions and the specific problems of the professional vocalist. In addition, the voice has become a stepchild of phoniatry. The study of normal and disturbed speech with all its implications has absorbed so much time and energy in research and therapy that the problems of the voice are frequently neglected.

The result is that the actor and singer who experiences difficulties with his voice is usually at loss where to turn for advice. With the tremendous growth of theatrical and musical life in America the care of these voice cases becomes a challenge to voice and speech therapists. Handling of such patients requires a close cooperation of the voice therapist with the laryngologist and the teacher of singing and dramatics.

The limitation of space allows only a review of the more important considerations. This discussion will deal only with such organic and functional disorders that have to be kept in mind in the evaluation of voice disturbances in artists.

Of the organic disorders *acute laryngitis* is the most feared and the most frequent of the vocal hazards of the professional. While it belongs primarily in the domain of the laryngologist, its functional implications very often go beyond the immediate impediment of the voice. Any sudden change in tissue condition easily upsets the precarious balance of body sensations which guide the professional vocalist. The danger of acting or singing with laryngitis lies in the formation of new and wrong patterns of voice production which may persist after all the tissue changes of inflammation have disappeared.

While acute inflammation or infection are easily diagnosed the chronic changes of the vocal organs are sometimes difficult to discover. The voice therapist who undertakes the treatment of a professional vocalist with voice difficulties of longer standing must be sure that all possible organic causes can be eliminated.

This is not always as simple as the textbooks make us believe. There is not a laryngologist alive who has not had the embarrassing experience of overlooking a small *polyp* that originated from the underside of the cords or below the anterior commissure. In doubtful cases only direct laryngoscopy can assure a complete view of the cords.

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Of the less conspicuous conditions that may form the basis of a voice disturbance the most important ones are allergies and metabolic disorders. *Allergies* are extremely common. It has been estimated that at least 3% of the population of the United States suffers from some form of respiratory allergy. While the more pronounced forms of allergy, like hayfever, are easily diagnosed, others are difficult to pin down. It is not generally known that isolated laryngeal allergies are not so rare. Depending on who sees these patients first they are often diagnosed as chronic laryngitis or as functional voice disturbances.

Allergies form a severe handicap for the professional vocalist. Seasonal allergies, most of all ragweed hayfever, incapacitate him for long periods during the theatrical and musical season. Perennial allergies to dust and other inhalants and to certain foodstuffs may impair the quality of the voice. The development of asthmatic symptoms in an undiagnosed and untreated allergy may put an end to a successful artistic career.

Metabolic disorders, based on dysfunction of the endocrine glands, should be kept in mind, too. A low metabolic rate leads to a retention of body-fluids in the surface tissues which may influence profoundly the character of the speaking and singing voice.

Nodes of the vocal cords are found in persons of all ages and professions, but to the singer and actor they constitute great danger to his working abilities. The nodes of the cords and their treatment are a classical example of the need for close cooperation between laryngologists, voice therapists and teachers of singing. There is now general agreement about the fact that nodes are invariably caused by wrong use or abuse of the voice. They are visible and organic changes of the cord tissues that are based on functional disturbances of the voice.

While the nodes are, as a rule, easily diagnosed, once the patient is seen by a laryngologist, the handling of these cases poses quite a problem. In most textbooks, both medical and logopedic, the accent of recommendation is on complete rest of the voice. Voice rest, as such, does not solve anything. Small and rather newly formed nodes may disappear under prolonged voice rest but they will always return as soon as voice production is resumed with the same wrong approach. Complete voice rest is difficult enough to enforce with children or with adults who do non-artistic work. But to the singer and actor the prescription of silence means a major catastrophe. It deprives him of his livelihood, awakens the fear of permanent damage to the voice and brings him into the danger-zone of severe depression.

Surgery is sometimes necessary to remove large and solidified nodes. Removal of small nodes is a very delicate operation, difficult even for the experienced laryngologist. The danger of removing too much or of creating a small scar that interferes with the free vibration of the cord is always there. Artistic speaking or singing requires such a perfect function of the cords that even a small structural change may alter the quality of the voice.

The treatment of nodes is, even at best, a difficult undertaking, and the outcome is hard to foretell. But the best results will be reached in close cooperation between laryngologist, voice therapist and teacher—and, of course, the patient, who has to realize the need for a complete reconditioning of his voice. In the hands of the voice therapist who is able to find out

what is wrong with the voice production of the patient, the conservative treatment of nodes is not as disappointing as it is often assumed. Limitation of space forbids a discussion of the methods to be used in the voice training of these cases. The chewing method as described by Froeschels has been found very useful. A report on a number of cases where nodes disappeared under treatment with the chewing method has been published elsewhere (*2*).

Contact ulcers are still a riddle in many respects. We do not know why they are seen more frequently in men, why they are relatively rare on the Continent while more common in America, and why the posterior part of the cords is the place of preference. The influence of strain or wrong use of the voice is not as exclusive a factor in the formation of these ulcers as it is in the development of nodes but it seems to be the most important cause. As Peacher and Holinger (*3*) and Baker (*1*) have pointed out, vocal re-education should form the cornerstone of the therapy of contact ulcers.

The voice therapist who undertakes the management of all kinds of functional voice disturbances in artists has to know something about the special conditions which are responsible for voice disorders in actors and singers. It is not enough to diagnose such voice troubles with the trained ear. One must be familiar with the more important of the conditions which may put the voice of the artist under special strain.

One of the more frequent causes of prolonged strain is the *extension of the voice range* beyond the natural compass. The majority of all voices are in the middle range, mezzo-sopranos and baritones. As a famous singing teacher once said, 'God must love the baritones because he made so many of them.' Very high and very low voices are rare and therefore very much in demand. There are few baritones who would not like to be tenors and reap the rewards in fame and money that are bestowed on them. Too many singers try to force their voices upwards and, unfortunately, too often the singing teacher shares this ambition. The constant singing in a range too high for the physical equipment puts a great strain on the vocal cords and vocal organs.

The opposite happens too, although not as frequently. Some of the famous contraltos of our time are really forced-down mezzo-sopranos and they pay for this extension of range with an early decline of the voice by disruption of the registers.

Aside from these overextensions of range that are caused by misguided attempts to stretch the voice beyond the natural limits we have to keep in mind the effects of disturbances of *mutation* on the basic level of the speaking voice and on the compass of the singing voice. These cases are rather frequent. The incomplete change of voice produces many artificial tenors and tenorinos, and actors who carry the high level of adolescent speech into adult life. We cannot deal here with the interesting pyschological background of the pathology of mutation but stress the importance of mutational disorders for the development of voice disturbances in professionals.

The determination of the natural range of a voice, of its artistic character and of the appropriate level of speaking pitch is not always easy. It requires great experience to find out whether a singer is a natural baritone or basso, a mezzo-soprano or a contralto, and whether he has the characteristic abilities of a dramatic, a lyric, a coloratura or a buffo voice. A care-

ful study of the physical characteristics of the cords, of the vocal organs, of the whole body structure, and the evaluation of the artistic personality is helpful in determining the type of voice. In addition to that, the use of the chewing therapy gives valuable clues because it helps to 'normalize' the level of the speaking voice.

In many singers who experience voice troubles early in their career the fault lies with the method of voice production. Really competent teachers of singing are scarce. Too often the young singer is trained by a teacher who lacks a sound knowledge of the physiology of singing.

Almost invariably the wrong technique is on the side of the use of too much force. The voice is, as we call it, *hyperfunctional*, with excessive use of muscular power or with artificial obstruction of the vibrating air column by muscular constriction. This tension has the tendency to spread from the point of origin to the whole vocal tract. After a period of singing with such hyperfunction the involved muscles, particularly the muscles of the cords, begin to weaken and *hypofunction* sets in with paretic hoarseness.

One of the most pernicious forms of hyperfunction is the *glottal stroke*, the forceful compression of the cords with subsequent explosive release of pent-up air. It produces the characteristic 'hard attack' of a note or of initial vowels that is frequently found in singers and actors who strive for a forcefulness beyond the natural dynamic limitation of their voice.

A frequent cause of voice disturbance is the excessive use of *covered singing*. Covering is a method introduced about 100 years ago in which the larynx is pulled downward and all the muscles of the vocal organs are under considerable tension. It gives the voice a dark and dramatic quality that makes it very suitable for Wagnerian and modern operas. It is in strong contrast to the 'open' form of singing, characteristic for the Italian Belcanto. Covering should be used with great care to avoid damage to the voice. As a rule, first-class singers exhibit a minimum of up-and-down movement of the larynx. Excessive movements are as indicative of a faulty technique as the lifting of the shoulders and the visible tightening of the neck muscles. Such singers will, sooner or later, develop voice troubles.

The singer who performs in a *musical show* works under difficult circumstances. While the operatic and the concert singer performs no more than a few times a week, the artist in a musical works eight times a week, with two performances on two days, and with only one day of rest. In the fierce competition of the artistic world he must often accept parts that overextend the true range of his voice. In addition, the parts he plays require at least as much speaking as singing. His training has, at best, equipped him with a good singing technique while the training of the speaking voice has usually been neglected. In his effort to make himself heard he is easily tempted to speak with excessive force. That happens rather frequently with former operatic stars who switch to musicals. Foreign-born opera singers have special difficulties in managing the speaking part of musicals. It is not their accent that leads them into voice troubles. Accent, although artistically undesirable, does not hurt the voice. But the difference in articulation, vocal stress and speech melody between their mother tongue and English tempts the artist to overcome difficulties by the use of force which, sooner or later, endangers the voice.

In the field of *acting* many dangers threaten the voice. Poor training of the voice and voice strain by overacting are responsible for many voice disturbances. A rather frequent occurence on the theatrical scene is the appearance of a film star as the leading man or lady in a stage play. Accustomed to work always with a microphone, they have no experience in the art of projecting the voice into a large theatre. Unless they put themselves into the hands of a voice therapist or a good teacher they invariably speak with excessive force. This and the strain of serial performance puts a heavy burden on the voice. It may crack up and force the artist to leave the show.

Radio actors have problems of their own. The radio actor is deprived of all visual aids in his characterizations. He must rely on the use of a disembodied voice to create the illusion of the part he plays. This leads easily to vocal overcharacterization and vocal strain. In addition, radio has developed an overemotional speaking style, with the hysterical urgency of the commercials, the artificial excitement of the newscasts and the daily catastrophes of the soap operas. More than any other actor, the radio actor is in need of technical advice and supervision by the experienced voice therapist.

Aging comes to the vocal organs as unavoidably as to all other parts of the body. It manifests itself in many vocal irregularities, culminating in wavering uncertainty of pitch and divergence of the registers. To the artist—more so to the singer than to the actor—the aging of the voice is a frightening prospect that spells an end to his career as an active performer. Perfection of technique might postpone the unavoidable for a number of years but in the end age will catch up with the vocal abilities. Nothing can be done about it. To watch the decline of a formerly great voice is one of the saddest experiences a voice therapist can have.

The *psychological factors* that surround the work of the actor and singer should also be mentioned. It is well known how deeply the voice is influenced by emotional stress, by the impact of personality problems and by conflicts of all kinds. That is doubly true with the artist who lives in an atmosphere of permanent excitement. The uphill struggle for artistic success, the constant fight to hold a hard-won prominence, the storing of tensions and their release in a creative blaze that surrounds every genuine artistic performance, all leave their imprint on the personality and voice of the artist. As long as these tensions can be channeled into creative release, no harm will be done to the voice. But where such a balance cannot be achieved the tensions will be transferred to the voice.

The treatment of voice disturbances in artists is a rewarding and expanding field for the voice therapist. Both organic and functional factors are instrumental in setting the mechanism in motion that leads to a disturbance of the voice. Familiarity with the special problems, the technical difficulties, the working conditions and the personality problems of the artist is needed to handle these cases successfully.

References

1. Baker, D. C. Contact ulcers of the larynx. *Laryngoscope*, 64, 1954, 73-78.
2. Brodnitz, F. S. and E. Froeschels. Treatment of nodules of vocal cords by the chewing method. *Arch. Otolaryng., Chicago*, 59, 1954, 560-566.
3. Peacher, G. and O. Holinger. Contact ulcers of the larynx: The role of vocal reeducation. *Arch. Otolaryng., Chicago*, 46, 1947, 617-621.

An Experimental Study Of The Possible Relation Between Errors Of Speech And Spelling

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FREQUENT comments have been made in the literature on speech disorders and in discussions of spelling errors to the effect that defects of speech and spelling may be related, or that a common factor, possibly phonetic in nature, may underly both. The discovery and description of any such relationships certainly should be of both theoretical and practical importance.

The present study was designed to explore the possible relationship between errors of speech and spelling through comparison of an experimental group of children with defects of speech of a basically phonetic character with a control group of speech normal children. The following factors were considered: (1) the relative frequency of spelling errors made by the children in each group; (2) types of spelling errors characteristic of each group; (3) performances of the experimental and control groups on measures of certain abilities which might theoretically be related to both pronunciation and spelling and (4) possible specific phonetic relationships between speech and spelling errors among the experimental subjects with defective speech.

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The literature on the possible relationship between errors of speech and spelling is somewhat scanty, particularly in experimental data, but some related studies will be found. Tidyman (*12*) early recognized a possible connection when he wrote:

> The study of phonics directly aids the learning of spelling by giving a knowledge of the sound values of letters; by developing clear articulation and accurate enunciation; by strengthening the association between common speech sounds and their literal equivalents; and by calling attention to the common elements of words.

A number of writers have noted the occurrence of speech difficulties among children whose spelling errors were the primary focus of study. Gates (*4*), in a survey of 135 grade school children with reading and spelling disabilities, found that 'serious difficulties in pronunciation or seriously incorrect or slurred pronunciations sometimes show a close and important relation to poor spelling.' After a study of 275 children needing remedial spelling instruction, Davis (*3*) concluded that 16 of this group had speech defects. In a somewhat more extensive investigation, Schonell (*10*) matched 105 children

with spelling disabilities with a control group and administered a number of tests of speech, arithmetic achievement, intelligence, sensory acuity and certain other factors. He found functional speech defects in 4.8 per cent of the experimental group and 2.6 per cent of the control group. Despite this small difference he considered that 21.8 per cent of the errors made in spelling by boys and 10 per cent of the errors made by girls were due to mispronunciation, although the rationale of separating the sexes for this calculation is not made clear. Schonell states:

> . . . if a child consistently pronounced inaccurately he not infrequently spelt inaccurately and the nature of his written errors bore a remarkable similarity to the nature of his spoken errors.

Pass (*9*), after an analysis of speech and spelling errors of 200 college freshmen, reported these types of language defects appear to be associated and commented:

> . . . articulatory defects included substitutions, omissions, distortions and additions as shown by their articulatory test scores and illustrated by the ways in which the words were misspelled.

Spelling errors themselves have been subjected to extensive analysis. Mendenhall (7), after a classification of the spelling errors of 100 children, concluded that they may be grouped as letter omissions, additions, substitutions or transpositions. He found 75 per cent of the errors represented reasonably phonetic spellings. Livingston (*6*) discovered similar types of spelling mistakes in a group of 125 nine- and 10-year old children and classified the errors as principally omissions and confusions, the latter being the same as Mendenhall's 'substitutions.' Other studies and the general literature on spelling defects are in substantial agreement with the foregoing descriptions of spelling errors. In addition to the references cited, a number of studies, such as that of Townsend (*13*), have investigated spelling errors as related to intelligence, school achievement and other variables.

Research into the etiology of functional articulatory defects in children discloses that this group may be deficient in a number of capacities which could theoretically also be related to spelling errors. It is generally recognized that intellectual retardation is more frequent among children with functional articulatory defects than in the general population as reported, for instance, by Carrell (*2*) and Nelson (*8*). Such factors as emotional disturbance, lack of adequate stimulation, poor physical status in infancy or early childhood, failure to achieve normal social and emotional growth and poor motor development—or any combinations of these—are accepted as among the etiological agents in speech retardation; *cf.*, for example, Van Riper (*15*). All are mentioned also in various discussions of the causes of spelling errors.

Of particular interest in the present connection are certain investigations of auditory memory span and ability to make auditory discrimination of the speech sounds among children with functional articulatory defects. Deficiencies in these related capacities might be considered of possible significance in causing spelling defects, if the latter are assumed to be based at least in part on phonetic difficulties. Travis and Rasmus (*14*) and Templin (*11*) found evidence that phonetic discrimination ability is significantly poorer in speech defective children as compared to a control group. Bilto (*1*) and Hansen (*5*) failed, however, to confirm this conclusion. Despite the somewhat equivocal nature of the

research findings on this point, there remains the assumption that at least in selected cases poor auditory perception of this type plays a significant role in causing functional articulatory defects.

A critical evaluation of the foregoing literature suggests that further investigation of possible interrelationships between speech and spelling errors is justified. There appears to have been no study specifically designed to explore this possibility and any incidental conclusions derived from previous studies of spelling errors must be regarded as incomplete and unsatisfactory.

Procedure

Experimental subjects in the present study were 33 children with what the writers prefer to call delayed speech. They ranged in age from eight to 13 and were in regular classroom grades 2 to 5 in a large city school system. All children in the experimental group were examined carefully to exclude any whose speech difficulties might be attributed to organic factors, hearing loss or significant emotional disturbance or whose defects did not meet the criteria as to type, as explained in the following paragraph. Twenty-four of the experimental subjects were boys. Grade distributions were as follows:

Grade	*N*
2	15
3	14
4	3
5	1

The term 'delayed speech' referred to what is perhaps more often called 'infantile speech.' The concept of delay was employed, however, because of the assumption that in each case the child's articulatory difficulty grew out of the fact that his speech learning had not, for functional reasons, advanced to a level appropriate to his chronological age. The errors were the customarily observed sound substitutions and omissions, with occasional distortion or transposition of sounds. It was felt that these subjects represented a homogeneous group which should demonstrate adequately any deficiencies in performance of the type which could hypothetically be of importance as causes of spelling errors.

Each child in the experimental group was paired with a speech-normal control. Matching was on the basis of age, sex, intelligence and teacher estimate of academic achievement, personality traits and home background. It was felt that the matching was good, although in some instances intelligence test scores could not be obtained and pairing of children on this factor was based on teacher estimates. In the case of one somewhat retarded speech defective child it seemed wise to select a control 11 months younger in order to equate other factors. All children in the control group had normal hearing, as determined by standard audiometric examination.

Data on spelling errors were gathered by having classroom teachers save all written papers for spelling, reading, language and social studies for a two-month period for children in the experimental and control groups. The total sample contained 37,625 words which were then analyzed for various types of spelling errors. These were classified, after Mendenhall, as additions, omissions, substitutions and transpositions. They were subsequently regrouped into 'phonetic' and 'non-phonetic' misspellings, the latter being arrangements of letters which would not

permit either correct pronunciation of the word or pronunciations heard among the speech defective group.

Because it was felt that deficiency in the ability to perceive the speech sounds might be one of the most probable factors which could underly both spelling errors and phonetic errors in speech, a sound discrimination test was devised. This consisted of 60 pairs of nonsense consonant-vowel combinations presented orally to the children by the method of paired comparisons. The nonsense syllables in each pair were the same in 24 of the 60 pairs and different in the remainder. The child was asked to make a judgment as to whether the sounds in each pair were the *same* or *different*. This test technique was patterned after that of Travis and Rasmus and others. Appropriate measures were taken by the examiner to hold loudness and inflection constant in calling the sounds and it has been the general opinion of experimenters using this technique that this can be accomplished within allowable limits. A test-retest reliability for nine experimental and nine control subjects was found to be .90.

It was felt also that it would be interesting to relate verbal capacity as reflected by vocabulary size to spelling and speech errors, particularly in view of previous reports which found a high positive correlation between vocabulary scores of various types and spelling ability. The vocabulary measure used in this experiment was a portion of the Wechsler Intelligence Scale for Children, which was administered in the standard manner.

Results

1. Relative frequency of spelling errors. Data were first analyzed to determine the relative frequency of spelling errors made by children in the experimental and control groups. The experimental group wrote 16,666 words and made 2,103 spelling errors, or 13 per cent. The control group wrote 20,959 words and made 1,751 errors, or 8 per cent, yielding a difference of 5 per cent in favor of the control group. Statistical calculation yielded a *t*-score of 1.57, which is not significant at the 5 per cent level of confidence. It must therefore be concluded that the experimental and control groups in this study did not differ significantly in general spelling ability.

2. *Types of errors.* Spelling errors of the two groups were next classified into phonetic and non-phonetic types. In the experimental group 638 words or 30 per cent of the spelling errors were judged to be phonetic, while 760 words or 43 per cent of the errors in spelling made by the control group were of this type. The *t*-score of this difference was 1.60, which is not significant at the 5 percent level of confidence. From this it may be concluded that the experimental and control groups did not differ significantly in the frequency with which they committed phonetic spelling errors. The total percentage of spelling errors of a phonetic nature made by the children in the present study is somewhat less than the 75 per cent reported by Mendenhall and reflects either a difference in performance of the two groups or differing criteria for 'phonetic' and 'non-phonetic' errors.

A compilation of the forms in which the spelling errors occurred is presented in Table 1. From this it may be seen that the experimental and control groups showed almost identical trends with respect to the types of spelling errors, with letter substitutions, omissions, word substi-

TABLE 1. Comparison of the percentage of spelling errors made by experimental and control groups.

Type of error	*Experimental Group*	*Control Group*
Addition	11	12
Omission	30	33
Substitution	51	46
Transposition	8	9
Word	20	19
Phonetic	30	43

tutions, additions and transpositions ranking in that order for both groups. The differences between the experimental and control groups were in no case statistically significant. These figures, incidentally, correspond closely with those of Mendenhall so far as rank order of frequency of error types is concerned. In general, these data seem to show that there are no characteristic errors made by children in the experimental group which differentiate them from a speech-normal population.

3. Comparison of experimental and control groups on vocabulary tests. To determine any relation between vocabulary and the frequency of spelling errors the raw scores of the vocabulary portion of the Wechsler Intelligence Scale were converted into scale scores. These ranged from 6.0 to 14.0 with a mean of 9.3 (*S. D.* 2.16) for the experimental group and a range of 6.0 to 15.0 with a mean of 9.4 (*S. D.* 2.07) for the control group. Correlation coefficients between vocabulary scores and number of spelling errors yielded values of .32 and .27 for the experimental and control groups respectively. It seems evident that as tested in this study the experimental and control groups cannot be differentiated on the basis of vocabulary score and that the relation between vocabulary level and spelling ability is of a low order. The findings reported here differ from those of Townsend, who found a high correlation between vocabulary and spelling ability in a group of children in grades 3 to 6. Different measures of vocabulary, differences in the age of subjects and the fact that Townsend measured spelling ability by a formal test rather than by examination of an unselected sample of written work might possibly account for this discrepancy.

4. Analysis of speech and spelling errors in experimental group. Data for the experimental group were next analyzed to determine whether or not the reported resemblance between speech and spelling errors, as mentioned in the summary of previous literature, were verified by the relatively large samples of such errors in the present research. Several related aspects of the performance of the experimental group also were investigated.

A tabulation of the letters of the alphabet (and their phonetic equivalents) involved in spelling errors is presented in Table 2, together with an indication of the number of children in the experimental group who could not (or did not) use this sound in speech. If a connection exists between speech and spelling errors, it might be supposed that the sounds in each kind of error would in general be the same. Inspection of Table 2 does not, however, appear to verify this hypothesis. On the contrary, the distribution of speech and spelling errors among the children in the experimental group is quite different. In rank order, the five sounds most frequently involved in speech errors are [l r s z dʒ] whereas the five letters most commonly involved in spelling errors are, in order, *e*, *a*, *n*, *r* and *t*. Allowing for the possible

TABLE 2. Letters and sounds involved in spelling errors as related to sounds missed by experimental group.

Letter	*Sound equivalent*	*Times missed by experimental group*		*% of total errors in spelling involving sound (or letter)*	
		N	*%*	*Exp. group*	*Control group*
L	l	26	78	4.6	3.5
R	r, ɚ, ɝ	23	70	6.9	8.1
S	s	22	67	4.3	3.8
Z	z	18	55	0.2	0.2
J	dʒ	17	51	0.1	0.1
K	k	15	45	1.9	1.3
V	v	14	42	1.1	0.4
T	t	12	36	6.8	5.5
D	d	11	33	6.4	5.3
N	n	8	24	8.0	6.3
G	g	7	21	2.3	2.2
H	h	2	6	3.0	3.7
M	m	2	6	3.9	2.6
Y	j	2	6	2.0	2.4
W	w	1	3	2.1	2.5
F	f	1	3	1.3	0.5
A	*	0	0	8.9	11.1
B	b	0	0	2.0	1.5
C	*	0	0	1.6	2.9
E	*	0	0	14.9	18.4
I	*	0	0	6.7	7.0
O	*	0	0	7.5	6.3
P	p	0	0	1.0	0.9
Q	*	0	0	0.1	0.0
U	*	0	0	2.1	3.6
X	*	0	0	0.2	0.1

*Phonetic equivalent variable.

phonetic interpretations of these letters only [r] is common to both groups. The obvious dissimilarity of the distribution of the letters or sounds involved in spelling and speech errors seems to make an attempt at detailed statistical analysis unwarranted.

Even though the speech and spelling errors observed in this study do not bear the 'strong resemblances' mentioned by earlier writers, there remains the theoretical possibility that a more generalized lack of ability to identify the speech sounds and discriminate among them may underly both speech and spelling mistakes. Such an hypothesis does not, however, appear to be supported by the data provided by the phonetic discrimination test. When scores on this measure were correlated with spelling ability, as represented by the reciprocal of the frequency of errors, the coefficients were found to be −.20 and .19 for the experimental and control groups respectively. These results were interpreted to mean that no significant relationship exists between sound discrimination and spelling abilities as measured in this study.

Some minor trends were noted which differ from the foregoing con-

clusion. When the frequency of misspellings of a phonetic character made by the experimental group was correlated with the severity of their articulatory defects, as measured by the number of defective sounds, the coefficient of correlation was .46. While this is suggestive only, it seems to indicate a tendency for children who have greater difficulty with the phonetic elements of speech to make more phonetic errors in spelling—although why this might be true is difficult to say. Results of a comparison of phonetic discrimination ability with the reciprocal of the frequency of phonetic misspellings are inconclusive, the coefficients of correlation between these factors being $-.43$ and $-.15$ respectively. No explanation for the apparent difference in performance between the groups can be offered.

Certain other findings involving the phonetic discrimination test are of interest. The mean number of errors on the test for the experimental and control groups was 6.94 and 5.18 respectively, a difference which is reliable at the 5 per cent level of confidence. It must be concluded that the phonetic discrimination ability of the control group was slightly superior, but not significantly so. The coefficient of correlation between the number of errors on the phonetic discrimination test and the number of defective sounds was .02, which seems to indicate that poor phonetic discrimination ability is not a significant general factor in the etiology of speech defects of the type possessed by the children in the experimental group. When the sounds involved in speech errors by these children were compared with sounds missed on the phonetic discrimination test no significant relationships were disclosed. There likewise were no significant differences between the experimental and control subjects as to the particular sounds missed on the phonetic discrimination test. Finally, there appeared to be no relationship between the letters (and their phonetic equivalents) involved in spelling errors and the sounds misheard on the phonetic discrimination test.

Summary and Conclusions

This study was designed to test the hypothesis that errors in spelling may be related to functional articulatory defects of the type displayed by children with mildly delayed speech, or that common etiological factors may underly both types of errors. Spelling errors of 33 experimental and 33 control subjects were determined by an inspection of all written work in school over a two-month period. Phonetic discrimination and vocabulary tests were administered. The data concerning the two groups were analyzed as to (1) the relative frequency of spelling errors; (2) the characteristic types of spelling errors; (3) the performance of the experimental and control groups on the vocabulary and phonetic discrimination measures and (4) possible specific phonetic relationships between speech and spelling errors in the experimental group.

In general, the conclusion which the data seems to justify is that there are no outstanding or significant differences between the experimental and control subjects in either spelling ability or in the types of spelling errors which occurred. Further, there appears to be no 'phonetic' disability which is reflected by comparable errors in speech and spelling among children with functional articulatory defects employed in this study. These conclusions, although negative, are considered worth reporting in some

detail because of the rather frequent assumption that speech and spelling errors are directly or indirectly related. Data gathered in the present study seem to show that if any such relationships exist they must be sought in areas other than those involved in this research. The data do tend to confirm, however, the hypothesis that inferior phonetic discrimination ability may be of etiological significance in some proportion of the population of children with functional articulatory defects of the type included in this study.

References

1. Bilto, W. E. A comparative study of certain physical abilities of children with speech defects and children with normal speech. *JSD*, 8, 1943, 187-203.
2. Carrell, J. A. A comparative study of speech defective children. *Arch. Speech*, 1, 1936, 179-203.
3. Davis, G. Remedial work in spelling. *Elem. Sch. J.*, 27, 1927, 615-626.
4. Gates, A. I. A study of the role of visual perception, intelligence and certain associated processes in reading and spelling. *J. educ. Psychol.*, 17, 1926, 433-445.
5. Hansen, B. F. The application of sound discrimination tests to children with functional articulatory defects with normal hearing. *JSD*, 9, 1944, 347-355.
6. Livingston, A. A. A study of spelling errors. *Brit. J. educ. Psychol.*, 16, 1946, 46.
7. Mendenhall, J. E. *An Analysis of Spelling Errors*. New York: Teachers Coll., Columbia Univ., 1930.
8. Nelson, O. An investigation of certain factors relating to the nature of children with functional disorders of articulation. *J. educ. Res.*, 47, 1953, 211-216.
9. Pass, M. F. An inquiry into the relationship between spelling and articulatory defects in high school freshmen. Master's Thesis, Univ. of Ala., 1950.
10. Schonell, F. J. The relation between defective speech and disability in spelling. *Brit. J. educ. Psychol.*, 4, 1934, 123-129.
11. Templin, M. C. A study of the sound discrimination ability of elementary school pupils. *JSD*, 8, 1943, 127-132.
12. Tidyman, W. F. *The Teaching of Spelling*. Yonkers, N. Y.: World Book Co., 1919.
13. Townsend, A. An investigation of certain relationships of spelling with reading and academic aptitude. *J. educ. Res.*, 40, 1947, 465-471.
14. Travis, L. E. and B. Rasmus. The speech sound discrimination ability of cases with functional disorders of articulation. *Quart. J. Speech*, 17, 1931, 217-226.
15. Van Riper, C. *Speech Correction Principles and Methods*. (Rev. ed.) New York: Prentice-Hall, 1947.

The Relationship Of Auditory Discrimination To Articulatory Defects Of Children With No Known Organic Impairment

Ernest L. Kronvall
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AUDITORY discrimination is generally defined as a judgment calling for a distinction or comparison among sounds. As a function it is not well understood. Whether it is inherent in the efficient operation of the mechanism for normal audition, whether it involves additional neurological processes, or whether it relates to a specific perception dependent upon training appear to be unanswerable at this time.

There seems to be no doubt of the existence of the phenomenon of auditory discrimination. There is considerable doubt, however, on the basis of objective studies as to the relationship of auditory discrimination to speech defectiveness.

Travis and Davis (*10*), using the Seashore Measure of Musical Talent (7), found significant differences between normal and defective speakers of various kinds in regard to pitch and intensity discrimination as well as tonal memory. Stinchfield (*8*), in a similar experiment, however, reports only slight differences which do not appear to be significant. Travis and Rasmus (*11*), using a speech sound discrimination test, compared articulation cases at various age levels with normals and found significant differences in favor of the normals at each age level. The factor of intelligence they found to be unrelated. In separate studies, Hall (*3*), Hansen (*4*), and Mase (*5*) studied articulation cases with no associated organic impairments and found no significant differences.

Although the objective evidence is contradictory, Van Riper (*12*), the Robbinses (*6*), and others nevertheless feel that formal training in auditory discrimination is essential in a therapeutic program for so-called functional articulation cases. On the other hand, Backus and Beasley (*1*) feel that formal training in discrimination is probably not critical for the successful achievement of adequate speech.

Since the problem appears to be important both in terms of diagnosis and therapy, additional research seemed warranted. The following is a report of such research.

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Selection of Subjects

Thirty elementary grade children—all with normal hearing—ranging in

age from six to nine years, and diagnosed by three speech specialists as severe (four or more sound errors) functional articulatory defectives, were matched on the basis of age, sex, grade, and intelligence with 30 normal speaking children. These data are shown in Table 1.

An important recent finding should be considered in evaluating the sampling. Everhart (*2*) reports on the basis of objective research that there are no significant differences for elementary grade children with and without articulatory defects in respect to onset of holding head up, onset of crawling, onset of sitting alone, onset of walking, onset of talking, onset of voluntary control of the bladder, eruption of first tooth, grip, height, weight, and handedness. He did, however, find that the speech defective group scored in the lower norm range for intelligence. It should be noted that the groups studied here are matched for intelligence.

Testing Instrument

To determine auditory discrimination scores, the Templin Speech Sound Discrimination Test (*9*) was used. The Templin test consists of 70 pairs of consonants combined with varying vowels. Nineteen pairs of identical and 51 pairs of different sound combinations are arranged in random order. Templin reports an odd-even reliability of the test of .81. In determining validity she considered correlation of performance on short and long forms of the test, correlation of performance with various independent measures and face validity. The latter item can be justified on the basis that the test includes all of the speech sounds arranged at random in pairs, some of which are the same and some of which are different.

Procedure

Subjects were tested individually by one examiner in a room relatively free from external noise. Test items were read with careful attention to keeping voice variables constant. Visual clues were avoided by a seating arrangement that prevented lipreading. An electrically recorded test form was not utilized because of the age level of the subjects involved.

Results

The *t*-test was used to determine the significance of the difference between the mean test scores of the two groups. Its use was justified by computing an *F* ratio to test for homogeneity of population variances. The obtained ratio $F=1.48$ indicated that variances were not significantly different.

The mean number of errors in discrimination for the experimental (de-

TABLE 1. Distribution of subjects in regard to sex, grade, age, mean age and mean I.Q. for both groups. (N, each group, 30)

Group	*Sex*		*Grade*			*Age Level*				*Mean Age in Months*	*Mean I.Q.*
	M	*F*	*1*	*2*	*3*	*6*	*7*	*8*	*9*		
Defective	16	14	12	11	7	8	12	10	0	89.7	100.2
Control	16	14	12	11	7	7	15	7	1	89.6	99.7

TABLE 2. Mean number of errors and standard deviation for defective and control groups, with *t*-ratio and probability level.

Group	*Mean Number of Errors*	*S. D.*	*t-ratio*	*P*
Defective	28.83	4.10	23.56	0.001
Control	12.37	3.37		

fective speech) group is 28.83. For the control group, the mean number of errors is 12.37. The difference between the means of the two groups is 16.47 in favor of the experimental group. The *t*-test of the significance of the difference between these two means yielded a $t = 23.56$ with 29 degrees of freedom. This difference is significant at less than the .001 level of significance. The results are presented in Table 2.

Summary

Thirty elementary grade children diagnosed as severe functional articulatory defectives were matched on the basis of chronological age, sex, grade, and intelligence with 30 normal speaking children. All of the subjects in both groups were tested individually by the same examiner using the Templin Speech Sound Discrimination Test. Statistical analysis of the data revealed that the difference between the mean discrimination errors of the two groups was significant at less than the .001 level of significance.

Conclusions

It is concluded within the limitations of this study that elementary grade children with severe functional articulatory disorders exhibit significantly more errors in speech sound discrimination than a matched group of normal speaking children.

The results of this study seem to indicate that one of the following hypotheses may be true:

1. A deficiency in auditory discrimination is the cause of some functional articulatory disorders.
2. Some articulatory disorders cause poor auditory discrimination.
3. Both functional articulatory disorders and deficiency in auditory discrimination are caused by some other condition.

It is felt that a possible explanation of previous contradictory findings lies in a varying definition and selection of subjects. Some studies, for example, include subjects with only one sound error as part of the experimental group.

The results of the present study would seem to add some support to the hypothesis that auditory discrimination techniques should be an integral part of the therapy for functional articulatory disorders. More controlled research in which these techniques are actually studied in therapeutic situations is needed, however, before additional conclusions can be drawn regarding this hypothesis.

Additional research investigating the actual mechanism of auditory discrimination is also indicated. If, for example, it could be objectively demonstrated that auditory discrimination is a learned response, the continued use of the diagnosis of *functional* articulatory defect for individuals with no associated organic impairments

who score low on a test of discrimination could be justified. As it stands currently, however, the use of this diagnostic term is debatable inasmuch as poor auditory discrimination may involve physiological processes.

References

1. Backus, O. and J. Beasley. *Speech Therapy with Children.* New York: Houghton, Mifflin, 1951.
2. Everhart, R. The relationship between articulation and other developmental factors in children. *JSHD*, 18, 1953, 332-338.
3. Hall, M. Auditory factors in functional articulatory speech defects. *J. exp. Educ.*, 7, 1938, 110-132.
4. Hansen, B. F. The application of sound discrimination tests to functional articulation defectives with normal hearing. *JSD*, 9, 1944, 347-355.
5. Mase, D. J. *Etiology of Articulatory Defects.* New York: Teachers Coll., Columbia Univ., 1946.
6. Robbins, S. D. and R. S. Robbins. *Speech Sound Discrimination Tests.* Boston: Expression Co., 1937.
7. Seashore, C. E., D. Lewis, and J. G. Saetveit. *Manual of Instruction and Interpretations for the Seashore Measures of Musical Talent.* Camden, N. J.: RCA Manufacturing Co., 1939.
8. Stinchfield, S. M. Some relationships between speech defects, musical disability, scholastic attainment, and maladjustment. *Quart. J. Speech*, 13, 1927, 268-275.
9. Templin, M. A study of sound discrimination ability of elementary school pupils. *JSD*, 8, 1943, 127-132.
10. Travis, L. E. and E. A. Davis. The relation between faulty speech and the lack of certain musical abilities. *Psychol. Monogr.*, 36, 1936, 71-81.
11. Travis, L. E. and B. Rasmus. Speech sound discrimination ability of cases with functional disorders of articulation. *Quart. J. Speech*, 17, 1931, 217-226.
12. Van Riper, C. *Speech Correction: Principles and Methods.* (Rev. ed.) New York: Prentice-Hall, 1947.

Environmental Influences On The Verbal Output Of Mentally Retarded Children

Bernard B. Schlanger

A CHILD'S responsiveness, as expressed in speech, is closely related to rewards he obtains from his environment. If the environment offers little motivation, speech and language development, dependent as these are on a satisfying psychological climate, are apt to be delayed. The retarding effect of institutionalization on speech development has been commented on by Sarason (*4*) in a comparison of mentally defective children in foster homes and in institutions. Others have noted the delayed oral language development of children in orphanages (*2, 3*). A study comparing the oral language ability of mental defectives found no significant differences between the mean number of grammatical errors in the speech of the retarded children whether they lived in an institution or home community, although the former consistently made a higher mean number of errors (*1*).

Speech diagnostic and therapeutic work with mentally retarded children in institutions and in special classes in city communities has led to the general observation that the speech potentials of both groups are about the same. There are marked differences, however, in their significant human relationships, frustrations and living experiences.

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Problem

Does institutional residence have any effect on the mental retardate's verbal output? The institutionalized child is deprived of certain motivational factors affecting speech through the severance of significant familial relationships, the lack of challenge offered in routinized living and the constant companionship of peers which minimizes his speech experiences and practice. As a result of these factors, it was expected that the children in an institution would achieve lower verbal output scores than children living at home. Two word-count measures were used for comparing verbalization. One was designed to obtain the mean length of sentences, a measure considered by many as the best single measure of language development (*3*). The other measure aimed at finding the average number of words used in a minute.

Subjects

Two groups of 21 mentally retarded children were selected for speech testing. One group came from an institution environment, the other lived at home with parents. The former group was drawn from 74 children

TABLE 1. Matching data of 21 pairs of retarded children from city and institutional environments (means and standard deviations).

Group	*C. A.*	*M. A.*	*I. Q.*	*Articulation Index*
City	12-4 ± 2-3	7-2 ± 1-9	59 ± 8.1	87.3 ± 10.0
Institution	12-5 ± 2-4	7-2 ± 1-9	59 ± 8.7	86.5 ± 13.1

from the St. Coletta School for Exceptional Children in Jefferson, Wisconsin (*5*). The latter group was selected from 70 children in speech therapy from the special classes of the Madison, Wisconsin, School System (7).[1] Subjects were matched on the bases of sex, C.A., M.A., I.Q., and consonant articulation proficiency. The latter, using an articulation index, was included because of the positive relationship found among these children between consonant articulation and the two verbal output measures which were compared (*6*). Table 1 gives the matching data. The M.A. and I.Q. means are identical, being respectively, seven years, two months and 59. There is a difference in C.A. means of only one month. Speech proficiency, as measured by the articulation index, shows a difference of less than one per cent in consonant articulation ability. In addition to the above measures, etiological matching was used.

The minimum age of admission to St. Coletta's is six years. The group from this institution had a mean length of residence of three years, seven months.

[1]It should be understood that there are limitations inherent in the choice of subjects from one institution. There are differences between institutions which affect the drive or need for oral communication. Emphases are placed on differing aspects of behavior. Stress or lack of stress on speech and language behavior improvement as part of the training program may be dependent on many factors, such as the capacity of the child, entrance regulations, administrative goals determined by experience and belief in the importance of adequate linguistic skill.

Methods

Samples of spontaneous conversation were obtained by means of responses to View-Master pictures. These are circular reels consisting of seven colored, three-dimensional pictures. It was found that, whether a single reel or several reels were used, a sufficient number of evaluative responses were obtained whose mean results were approximately equal. Several different children's stories were used. For each member of a pair of children, however, the same story acted as a stimulus. A tape recording of the oral responses of the children was made after the examiner had had several meetings with each child. The explanation preceding the recording included the naming of the story, the characters in the fairy tale and the admonition to 'click' the next picture when they were through telling all about it. All of the children had received a practice session prior to the test recording. Using word-counting techniques, mean sentence length and number of words per minute, scores were obtained and statistically analyzed.

Findings

The results are presented in Table 2. The superiority of the city children

TABLE 2. Comparisons of means of verbal output measures and levels of confidence between 21 pairs of matched city and institutionalized retarded children.

Measure	*Group*	*Mean*	*Mean Difference*	*S. E. of Mean Dif.*	*t*	*Level of Significance*
Mean Sentence Length	City	5.36 ± 2.09	1.18	.36	3.3	1%
	Inst.	4.18 ± 1.86				
Number of Words Per Minute	City	64.9 ± 30.9	15.2	6.7	2.27	3%
	Inst.	49.7 ± 23.4				

in language development is evident so far as these measures evaluate this skill.[2] The city children achieved a mean sentence length of 5.36 words compared to the institutionalized children's mean of 4.18 words. This difference of 1.18 is significant at the one per cent level of confidence.

The 64.9 words per minute score obtained by the city children was 15 words more than the mean of 49.7 of the institution children. This difference is significant at the three per cent level of confidence. That this group of mentally retarded children residing in a city community and attending special classes has a greater verbal output as measured by mean sentence length and number of words per minute than the institutionalized children may be accepted as significant at a high level of confidence.

Conclusions

In attempting to explain these differences in favor of the city children, several contributing causes may be considered. The affect produced by the severance of familial ties can not be discounted. The emotional reactions produced by this traumatic act may result in some loss of security in interpersonal relationships which is expressed in minimal verbalization. Another result of the severance of these significant relationships may be the blocking of the continuing imitation of the familial speech models. Substituting for these more mature linguistic patterns are those of their peers. The almost complete association with subnormal peers lessens the desire and need for oral communication by minimizing their speech experiences. Overt actions substitute for verbalization and in this way eliminate the practice needed to develop and maintain adequate speech patterns. It is also felt that the lack of privacy involved in large group living overstimulates many of these children. Many are hyperactive and extremely distractible. Overstimulation of some of the children may affect their speech behavior to the point of actual withdrawal.

An important factor in what seems to be a loss of speech motivation may be a result of fewer challenges from the environment. Limited horizons and necessary routine offer infrequent novel experiences stimulating talkativeness.

Discussion

It is possible to improve speech behavior in institution settings. Many institutions for the mentally retarded

[2]The differences would have been even greater if final scores of the city children had been used after they had received a year of speech therapy (7).

are aware of the mental health problem of the deprivation of factors which augment speech development. Within the writer's experience, some institutions have recognized these speech needs. St. Coletta has a speech therapist working with the children while the teachers attend the sessions. In this way the problems are recognized and procedures are carried over into the classrooms. Northern Colony of Chippewa Falls, Wisconsin, has opened a position on its Education Staff for a speech therapist. The Training School at Vineland, New Jersey, has had an active speech training and research program for the past few years, employing two speech professionals for diagnosis, clinical and class improvement work. There are many others aware of the need to make the acquisition and retention of speech and language skills rewarding to the children. These children, subsequently, are more likely to develop an interest in, awareness of, and satisfaction in people and their talk.

Within limitations of mental abilities, sensory problems and behavior, institutions might consider the following possibilities for minimizing speech deprivation:

1. The inclusion of speech personnel on their staffs to direct speech correction and motivational work in the education and training programs.

2. Greater stress on oral communication in vocational and educational programs.

3. Closer 'outside' community ties, enabling children to experience varied, normal activities, such as mailing letters, visiting municipal offices, riding buses, shopping, etc. For those who show promise, as many higher grade children do, of being integrated into city community life, the possibility of including some in the special classes in regular schools off the institution grounds, might be considered.

4. Breakdown into smaller units with more 'cottage parents' supervising. These units might consist of varied age ranges so that the younger children could profit from whatever abilities, maternal and paternal stimulation and satisfying contact might be obtained from the older children in such groupings.

The task of maintaining and augmenting speech and language development is difficult when the numbers, the setting, and the individual physiological and psychological problems are considered. It offers a challenge that should motivate speech teachers and the personnel of the institutions. Gains in the speech area show up in greater self-confidence. As this increases, the mentally defective child finds growing dignity and self respect in his ability to express himself and be assured of a greater possibility of success in either the 'outside' or institution community life.

Summary

Twenty-one matched pairs of mentally retarded children from city and institution community environments were tested for verbal output. Comparisons of mean sentence length and words per minute scores indicated significant differences between these two groups. The suggested causes for the lower language output of the institutionalized children included the loss of speech motivation, the complete association with peers and overstimulation from such continual contact. The severance of familial ties was also considered as blocking language development. Suggestions as to how institutions might meet the problem of speech deprivation of young children considered the developing of speech programs by qualified personnel and more varied experiences for the children, as well as more frequent adult contact.

References

1. Carlton, T. and L. E. Carlton. Errors in the oral language of mentally defective adolescents and normal elementary children. *J. gen. Psychol.*, 56, 1945, 183-220.
2. Gesell, A. and C. S. Amatruda. *Developmental Diagnosis.* New York: Paul B. Hoeber, Inc., 1947.
3. McCarthy, D. A. Language development in children. In Carmichael, L. (ed.) *Manual of Child Psychology.* New York: John Wiley, 1946.
4. Sarason, S. *Psychological Problems in Mental Deficiency.* New York: Harper, 1949.
5. Schlanger, B. B. Speech examination of a group of institutionalized mentally handicapped children. *JSHD*, 18, 1953, 339-349.
6. ———. Speech measurements of institutionalized mentally handicapped children. *Amer. J. ment. def.*, 58, 1953, 114-122.
7. ———. Speech therapy results with mentally retarded children in special classes. *Train. Sch. Bull.*, 50, 1953, 179-186.

An Empirical Investigation Of The Loss Of Spelling Ability In Dysphasics

John R. Thurston

IN PREDICTING what will be retained and what lost in a particular case of dysphasia, many diverse explanations have been advanced, some of the classic ones being: localization of each function in circumscribed cortical areas and differential destruction of various 'centers' (Henschen, Pitres); loss of recently learned material, retention of remote learnings (Ribot); greater loss in more difficult activities than in simple activities (Marie, Pick); greater retention of material that has been frequently practiced (Head); greater loss in efficiency when the task arouses anxiety than when it is neutral in emotional tone (Wepman); greater loss of symbolic behavior with larger cortical lesions (Lashley).

Each of these explanatory hypotheses poses tremendous difficulties in the design and execution of appropriate empirical tests. The accumulation of empirical data concerning dysphasia is held to be a necessary first step in such research which has as its ultimate goal the formulation of the all-embracing theoretical system that is necessary for a complete understanding of dysphasia.

The point of departure for a systematic study of dysphasia which is most convenient in terms of contemporary psychological knowledge and technique is the one suggested by Pick's early speculations, i.e., greater loss in more difficult activities than in simple activities. Spelling suggests itself as a verbal task which could be utilized in an investigation of certain implications of Pick's formulations. Spelling ability shows a regular development over a given range of the individual's life. The spelling of certain easy words is acquired relatively early in life while the spelling of other, more difficult words is learned later (*1*), so that this measure is contaminated by recency and practice effects. There can be plotted, however, a definite progression on the spelling ability of an individual. Spelling is required of an individual throughout his lifetime and becomes well-established through this considerable practice. Spelling is, of course, a complex task involving both oral and written responses. Both of these types of responses have been used frequently in the investigation of spelling aptitude, achievement, and cause of spelling difficulties.

It seems clear, therefore, that spelling responses are appropriate to an empirical study of dysphasia. Using the formulations of Pick as a guide,

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TABLE 1. Total spelling word list at the four levels of difficulty.

Level I	*Level II*	*Level III*	*Level IV*
1. back	2. drill	3. mere	4. ghost
5. till	6. spent	7. ache	8. dodge
9. stand	10. both	11. haste	12. meant
13. name	14. bench	15. whose	16. group
17. most	18. drum	19. text	20. cure
21. give	22. stamp	23. clerk	24. bulk
25. small	26. drop	27. sire	28. judge
29. food	30. north	31. strict	32. urge
33. hill	34. thin	35. booth	36. worse
37. stove	38. sort	39. bluff	40. debt
41. near	42. case	43. skirt	44. laugh
45. from	46. rent	47. fern	48. chief
49. girl	50. glass	51. sleet	52. touch
53. gave	54. floor	55. cute	56. built
57. want	58. dice	59. view	60. brief
61. green	62. safe	63. firm	64. type
65. town	66. grind	67. smooth	68. force
69. sport	70. dose	71. clothe	72. search
73. think	74. hate	75. quote	76. fault
77. child	78. street	79. term	80. scarce

it might be expected that the dysphasics would give a significantly poorer performance on the more difficult words than on the easier words when compared to normal persons. Another formulation could be made which states that the trauma occasioning the dysphasic condition is general in nature and results in a reduction of spelling ability in a general manner so that the dysphasic could be described merely as a 'poor speller.' Still another formulation could be made which states that the intra-cranial brain damage without dysphasia would result in a reduction of spelling ability similar to that reduction occasioned by the dysphasic condition.

Procedure

Subjects. The experimental group, comprised of 30 patients (27 males and 3 females) between 19-64 years (median age — 44; median education — 12 years) with diagnosed dysphasia, was chosen from several hospitals and speech clinics. Since they were to perform on an oral spelling task, the requirement that they be able to spell their own name orally was imposed.

Sixty male patients between 21-68 years of age (median age — 44.5; median education — 12 years) with at least eight grades of education and with no known encephalopathy were selected by means of stratified random sampling from a general hospital population to constitute the first control group of this study.

Twenty patients (17 males and 3 females) between 17-65 years of age (median age — 44.5; median education — 11 years) with at least eight

TABLE 2. Mean spelling scores for dysphasic, brain-damage and normal groups at four levels of difficulty.

Group		Difficulty Level I	II	III	IV	Total
Dysphasics	*M*	14.87	12.50	7.60	6.47	41.43
(N=30)	*S.D.*	4.76	5.85	5.84	5.79	21.44
Normals	*M*	19.55	19.50	17.13	16.82	73.00
(N=60)	*S.D.*	.99	1.05	3.26	3.56	8.06
Brain-Damage	*M*	15.30	15.15	12.10	11.95	54.50
(N=20)	*S.D.*	4.45	4.28	4.94	5.24	18.03

grades of education, with some form of intra-cranial pathology but without manifest dysphasic symptoms were selected to constitute the second (brain-damage) control group.

Selection of Words. All words selected to make up the four difficulty levels of this study were single syllable words containing four to six letters. Contractions, homophones and proper nouns were excluded.

The specific criteria for each of the difficulty levels were: Level I (least difficult) words were passed by over 50% of second graders and over 90% of fourth, sixth, and eighth graders; Level II words were passed by less than 50% of second graders, but by over 50% of fourth graders and over 90% of sixth and eighth graders; Level III words were passed by less than 30% of second graders, by less than 50% of fourth graders but by over 50% of sixth graders and 90% of eighth graders; Level IV (most difficult) words were passed by less than 8% of second graders, less than 30% of fourth graders, less than 50% of sixth graders but by over 50% of eighth graders.

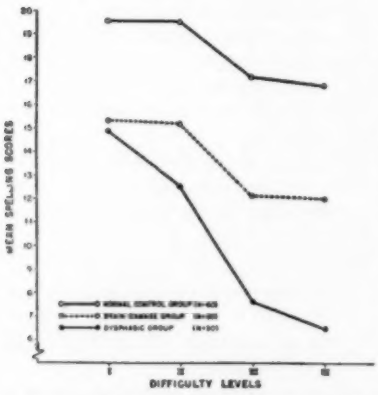

FIGURE 1. Curves indicating mean spelling performance of three groups (Dysphasics, Brain-Damage and Normal control) on words at four levels of increasing difficulty.

Twenty of the words in the Iowa Spelling Scale (*1*) at Difficulty Level I, which satisfied the criteria, were selected at random to constitute List I. Twenty words were drawn from each of the other Difficulty Levels for Lists II, III, and IV. The words from these four lists were assigned in a cyclical omnibus order in the Total List of eighty words (Table 1).

Administration. Oral responses were required of the patient. The patient was given credit for the total number of words which were spelled correctly on the first attempt or were corrected spontaneously.

Results and Discussion

The points plotted in Figure 1 and listed in Table 2 show the mean spelling performance of Dysphasics, Brain-Damage patients, and Normal patients at four levels of difficulty. The curves indicate a precipitous decrease in the number of correct words for the Dysphasic group and a lesser although progressive decrease for the Normal control group. The test for vertical displacement (2) of the over-all means of these curves resulted in an F of 99.20 which is significant beyond the .001 level for 1 and 88 *d.f.*; the Dysphasics were inferior to the Normal patients at all levels of difficulty. A trend analysis yielded an F of 39.74 for the Methods $\times$ Trials interaction, permitting a rejection of the hypothesis of parallel curves at the .001 level for 3 and 264 *d.f.* The inferior performance of the Dysphasics became more marked on the more difficult words.

Educational level and age within the group of Normals were considered to be important factors affecting the spelling performance. The older and less educated patients were expected to be the 'poor spellers.'

To investigate the effects of age upon spelling performance, the Normal control group was divided at the median age (44.5 years) into an Old Normal group and a Young Normal group. It was found that the Old Normals showed a significantly greater decrease ($p < .01$) in the number of words spelled correctly when compared to the number of words spelled correctly by the Young Normals. The Young Normals were significantly superior ($p < .01$) to the Old Normals at all levels of difficulty.

To test the effects of educational level upon spelling performance, the Normal control group was divided at the median educational level (12 years) into High and Low Education groups. There was a significantly

TABLE 3. Mean spelling scores at four levels of difficulty for normal patients divided according to age and education.

Group		*Age*	*Educ.*	*Difficulty Level* I	II	III	IV
Age Grouping*							
Old Normals	*M*	56.05	11.00	19.20	19.17	16.17	15.60
(N=30)	*S.D.*			1.22	1.32	3.64	3.94
Young Normals	*M*	31.30	11.63	19.90	19.83	18.10	18.05
(N=30)	*S.D.*			.30	.52	2.43	2.60
Education Grouping†							
Low Education	*M*	46.16	8.68	19.32	19.32	15.76	15.20
(N=25)	*S.D.*			1.05	1.24	3.49	3.80
High Education	*M*	42.05	13.20	19.71	19.43	18.11	17.99
(N=35)	*S.D.*			.85	.70	2.31	2.52

*Group split at 44.5 years of age.
†Group split at 12 years of education and higher.

greater decrease ($p < .001$) in the number of words spelled correctly by the Low Education group when compared to the performance of the High Education group. The High Education group was significantly superior ($p < .01$) to the Low Education group at all levels of difficulty.

The mean values for spelling performance of the High and Low Education Normal groups as well as the Young and Old Normal groups are listed in Table 3. It must be stated that the criteria of age and education were not independent in these groups, i.e., some of the same cases are in the two sets of extremes, leading to a correlation between the respective categories. Hence, when significant effects were found for age, it became more likely that similar results would obtain for educational level.

It was necessary to test the hypothesis that the trauma occasioning dysphasia caused normal people of a given age and education to perform on this spelling test in a manner similar to older or less educated people ('poor spellers'). An analysis of variance was conducted to effect the comparison of the Dysphasic group with each of these two groups (Old Normals, Low Education). The greater decrease in the number of words spelled correctly by Dysphasics as the words became more difficult when compared to the number of words spelled correctly by either of the 'poor speller' groups was found to be significant at the .001 level. The test for vertical displacement of the overall means indicated that the dysphasics were inferior to both groups of 'poor spellers' at all levels of difficulty; the difference was significant at the .001 level.

A comparison was made of the spelling performance of Dysphasics and that of the non-dysphasic, Brain-Damage cases (Figure 1, Table 2). This was done to investigate the hypothesis that brain injury per se, rather than those lesions leading to dysphasia, caused the particular pattern of spelling test results that have been previously noted in this study. The test for vertical displacement indicated that there was no difference between the effects of dysphasia and brain-damage upon total spelling performance ($.01 < p < .05$). The groups were considered as having approximately the same total spelling performance. There was, however, a significantly greater decrease in the number of words spelled correctly by Dysphasics as the words became more difficult when compared to the performance of Brain-Damage patients ($p < .001$).

Summary

The present study was designed to gather empirical data through an investigation and comparison of the oral spelling behavior of dysphasics, brain-damage patients and normal hospital patients.

A total of 30 dysphasics, 20 brain-damage patients and 60 normal patients were the subjects of this study. Each subject responded orally to a list of 80 spelling words so divided as to constitute four levels of increasing difficulty.

The following results were obtained from this study:

1. Dysphasics achieved an inferior performance on the spelling test as a whole when compared to normals and this inferiority was particularly marked on the more difficult words.

2. Low education and old age reduced spelling performance in the same general manner (although not to the same extent) as dysphasia when the words became more difficult.

3. Comparison of dysphasics with 'poor spellers' (Old Normals and Low Education Normals) showed that the dysphasics were more inferior in oral spelling performance than either of these groups.

4. The brain-damage patients resembled the dysphasic group in total score but did not show the marked decrease in performance on the more difficult words that was noted in the case of dysphasics.

References

1. Ashbaugh, J. E. The Iowa spelling scales. *J. Educ., Res. Monogr.* 3, 1922.
2. Lindquist, E. F. *Design and Analysis of Experiments in Psychology and Education.* New York: Houghton Mifflin, 1953.

The Conditioned Galvanic Skin Response Under Two Modes Of Reinforcement

Clay L. Meritser

Leo G. Doerfler

THE GALVANIC skin response has been used by a number of research investigators in conjunction with auditory stimuli. Stewart (*18*) used GSR with normal-hearing young adults and found that, with proper experimental design, conditioned GSRs following audible pure tones could be distinguished from GSRs of a chance nature. Differentiation was made through the application of objective criteria covering the amplitude-time relationship of responses to stimuli. Using a similar technique to test hard-of-hearing subjects, Doerfler and McClure (*1*) found no significant differences between their GSR thresholds and those obtained with standard audiometric technique. While investigating the effect of 'set' in human conditioning, Girden (*2*) demonstrated that thresholds obtained by measuring GSR were substantially the same as those obtained with standard audiometry.

The type of criteria applied to the GSR—that is, the way it is measured—appears to influence considerably the interpretation of conditioning as a measurement. In contrast to the criteria used by Stewart, Doerfler and McClure, Girden used the development of a response to low intensities which originally did not evoke a GSR. In many other experiments, amplitude of the response has been considered sufficient measurement. Studies by White and Schlosberg (*19*), Grant, Meyer and Hake (*3*), Grant and Schneider (*5*), Stanley (*16*), and Grant and Schiller (*4*) considered amplitude, or magnitude, of the GSR the element to be measured.

The GSR has also been applied clinically in audition. In at least one center it has been in use extensively as a tool in the testing of hearing.

The measurement of the GSR in this clinical setting appears to be dependent upon experience and subjective judgment of the tester in differentiating meaningful deflections of the recording needle from those deflections which have no relationship with the presented stimuli. Hardy and Pauls (7) maintain:

> As matters stand, any positive wave form which occurs within acceptable time-relations to the presentation of the test-tone is significant as a response. In some instances, as threshold is approached, even a pause in the negative swing of the galvanometer may be a significant response. The wave forms one learns to look for are typical, however, and not too difficult to differentiate from those which reflect responses to other than the controlled auditory stimuli.

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This question of subjective interpretation in the use of GSR audiometry appears to be a barrier to wider clinical use of this technique.

Consideration is presently being given to the possibility of removing some of the difficulties attendant upon GSR audiometry. Our research is concerned with attempts to objectify the technique sufficiently to remove some of the avowed necessity for long experience in its use. It is felt that if the technique is to fulfill the promise of clinical effectiveness it must be capable of use by conventionally trained audiometrists.

A fact pointed out repeatedly in the literature is that GSR is not specific to an acoustic stimulus. Rather, it seems to be capable of being triggered from many different stimuli. Because of this lack of specificity, it is felt the GSR must be conditioned by means of some unconditioned stimulus. Most of the investigators named previously have used electric shock as the unconditioned stimulus in experimental work with the GSR, and it is today being used clinically for hearing testing.

No questions have been raised as to the efficacy of electric shock as the unconditioned stimulus. Much work has been done in conditioning, however, on the problem of the ratio of reinforcement, in order to determine whether resistance to extinction would be affected by the degree of reinforcement during conditioning.

The ratio of reinforcement has been generally termed either partial or total. If an unconditioned stimulus is presented each time the conditioned stimulus is presented, reinforcement is considered to be total, or 100%. If reinforcement is less than 100%, it is considered to be partial.

Summarizing the experimental work done during the last decade, Hovland (*11*) points out that most findings substantiate the point of view that partial reinforcement is associated with greater resistance to extinction than is total reinforcement. Humphreys (*12, 13, 14, 15*) especially emphasizes this relationship. He shows that partial reinforcement—in particular, 50% reinforcement—is associated with greater resistance to extinction and to greater generalization of responses. Grant, Meyer and Hake (*3*), using a pure tone as conditioned stimulus with human subjects, report that the rate of extinction is slower when partial rather than total reinforcement with electric shock as unconditioned stimulus is given. Hardy and Bordley (*6*), however, in discussing their clinical technique, indicate that tone and shock are paired in presentations, and thus are apparently routinely employing 100% reinforcement. Because of the different emphases in the experimental and clinical approaches to date, it was felt that the matter of ratio of reinforcement should be investigated in this particular modality with pure tone as the conditioned stimulus and electric shock as the unconditioned stimulus.

The Problem

The problem in this study was to determine the relationship of reinforcement ratio to resistance to extinction of the conditioned galvanic skin response. A secondary problem was to determine the relationship of varied intensities of the conditioned stimuli to the resistance to extinction.

The specific questions asked were:

1. Will resistance to extinction of the conditioned galvanic skin response to a pure tone under partial reinforcement (40%) differ from resistance to extinction under total reinforcement?

2. Will resistance to extinction of the conditioned galvanic skin response to a pure tone be affected if the intensity of the tone is varied or is kept constant, both in acquisition and extinction?

Subjects

Fifty-six subjects, adult volunteers, were used in this study. All of these subjects lived in the city of Pittsburgh.

Restrictions imposed for selection of subjects were: (1) age between 18 and 50; (2) response in the ear to be tested to a pure tone of 1000 cycles at 15 db re normal threshold.

Apparatus

The GSR detector utilized in this experiment has been described in previous publications (*1, 17*). It is essentially a band pass amplifier with a lower cut-off frequency of 0.3 cps and an upper cut-off frequency of 5 cps. It is battery-operated and provides a special input circuit that does not require adjustment to the individual subject.

This detector was designed to define the unit of response. Older, conventional instrumentation requires almost continual bridge balancing to keep the needle of the recording apparatus on the chart paper; also, conventionally-used dc amplifiers respond to many internal phenomena and thereby mask the GSR through increased 'background.' The amplifier here employed responds only to the initial drop in skin resistance. The long recovery change in resistance is excluded by the differentiation circuit.

Conditioning

The conditioned stimulus was a pure tone produced by a commercial audiometer. The conformance of this audiometer to Bureau of Standards calibration was checked by artificial ear at the University of Pittsburgh Department of Audiology.

Table 1. Division of 56 subjects into groups by schedule of reinforcement, mode of acquisition and mode of extinction.

	Schedule I 40% Reinforcement (28)		*Schedule II 100% Reinforcement (28)*	
	Acquisition:		Acquisition:	
Extinction:	Intensity Constant (14)	Intensity Variable (14)	Intensity Constant (14)	Intensity Variable (14)
Intensity Constant	7	7	7	7
Intensity Variable	7	7	7	7

The 1000-cycle tone was presented at levels of 30, 50 or 70 db above normal threshold, depending on the experimental group in which a given subject was placed. Table 1 shows the manner in which the total number of subjects was divided into the experimental groups. Presentation of the tone lasted for three seconds.

To secure conditioning, an unconditioned stimulus was needed which would: (1) invariably produce a detectable skin response; (2) permit onset and termination as desired by the experimenter; (3) permit initial adjustment to individual sensitivity as shown by subject reactions. The unconditioned stimulus was a pulsatile electric shock produced by an inductorium. The pulsatile shock was presented for approximately 0.4 second immediately upon the cessation of the conditioned stimulus (pure tone).

The conditioned stimulus, a pure tone, was automatically presented (Tables 2, 3, 4, 5) to the subject, at an intensity determined by the presentation order, for three seconds when the button of a cam-operated

TABLE 2. Acquisition of conditioning presentation order; Reinforcement—40%, Stimulus Intensity—Constant.

Presentation Number	*Sensation Level (db)*	*Time Interval between Presentations (seconds)*	*Shock or No Shock*
1	30	20	S
2	30	35	NS
3	30	20	NS
4	30	20	S
5	30	25	NS
6	30	20	S
7	30	40	NS
8	30	30	NS
9	30	40	NS
10	30	35	S
11	30	25	S
12	30	35	NS
13	30	25	NS
14	30	20	NS
15	30	25	NS
16	30	35	NS
17	30	25	S
18	30	25	S
19	30	25	NS
20	30	35	S
21	30	20	NS
22	30	35	NS
23	30	30	S
24	30	25	S
25	30	40	NS

cycling device[1] was pressed by the experimenter. At the onset of the tone, the needle of the recorder marked a 'pip' which rose approximately one-half inch above the baseline of the record. This mark was used only for calibrating onset of the tone.

The pulsatile shock was automatically presented at cessation of the tone when the presentation order indicated. An accessory ink-writer indicated automatically on the margin of the record whenever shock was presented.

[1]The cam-operated cycling device permitted automatic presentation and recording of all stimuli, conditioned and unconditioned, and responses. For details see Stewart (*18*).

Presentation Orders and Division of Groups

The total population for this study, 56 individuals, was assigned in a random manner to two groups of 28 each. One group received random reinforcement with the unconditioned stimulus (electric shock) 40% of the time. This group was called the 40%-reinforcement group, or Schedule I group. The remaining twenty-eight subjects, or Schedule II group, received reinforcement with the unconditioned stimulus each time the conditioned stimulus was presented—or 100% of the time (Table 1).

Within each of these reinforcement groups, a division was made: one-half of the twenty-eight subjects was

TABLE 3. Acquisition of conditioning presentation order; Reinforcement—40%, Stimulus Intensity—Variable.

Presentation Number	*Sensation Level (db)*	*Time Interval between Presentations (seconds)*	*Shock or No Shock*
1	50	20	S
2	70	35	NS
3	70	20	NS
4	30	20	S
5	30	25	NS
6	30	20	S
7	50	40	NS
8	50	30	NS
9	70	40	NS
10	70	35	S
11	50	25	S
12	50	35	NS
13	50	25	NS
14	30	20	NS
15	70	25	NS
16	70	35	NS
17	70	25	S
18	70	25	S
19	30	25	NS
20	50	35	S
21	50	20	NS
22	50	35	NS
23	50	30	S
24	70	25	S
25	70	40	NS

TABLE 4. Acquisition of conditioning presentation order; Reinforcement—100%, Stimulus Intensity—Constant.

Presentation Number	*Sensation Level (db)*	*Time Interval between Presentations (seconds)*	*Shock or No Shock*
1	30	20	S
2	30	35	S
3	30	20	S
4	30	20	S
5	30	25	S
6	30	20	S
7	30	40	S
8	30	30	S
9	30	40	S
10	30	35	S
11	30	25	S
12	30	35	S
13	30	25	S
14	30	20	S
15	30	25	S
16	30	35	S
17	30	25	S
18	30	25	S
19	30	25	S
20	30	35	S
21	30	20	S
22	30	35	S
23	30	30	S
24	30	25	S
25	30	40	S

presented with a stimulus of constant intensity (30 db re normal threshold) during acquisition of conditioning; the other half received a conditioned stimulus of randomly varied intensity (30, 50 or 70 db re normal threshold) during acquisition. Within each acquisition group one-half the subjects was extinguished at constant intensity of the conditioned stimulus (30 db re normal threshold) and the other half was extinguished at varied intensities of the conditioned stimulus (30, 50 and 70 db re normal threshold). Presentation of both conditioned and unconditioned stimuli was randomized with respect to time. The four presentation orders are shown in Tables 2, 3, 4, 5.

The presentation of stimuli proceeded according to the presentation order for that subject. The minimum time interval between presentations was 20 seconds and the maximum 40 seconds. This minimum was considered to be sufficient to allow for recovery of skin resistance; the maximum was considered sufficient to allow for large enough range of intervals between presentations.

When, during the acquisition presentations, three consecutive responses occurred which met specified criteria of amplitude, slope and latency relationships, the subject was considered

TABLE 5. Acquisition of conditioning presentation order; Reinforcement—100%, Stimulus Intensity—Variable.

Presentation Number	*Sensation Level (db)*	*Time Interval between Presentations (seconds)*	*Shock or No Shock*
1	50	20	S
2	70	35	S
3	70	20	S
4	30	20	S
5	30	25	S
6	30	20	S
7	50	40	S
8	50	30	S
9	70	40	S
10	70	35	S
11	50	25	S
12	50	35	S
13	50	25	S
14	30	20	S
15	70	25	S
16	70	35	S
17	70	25	S
18	70	25	S
19	30	25	S
20	50	35	S
21	50	20	S
22	50	35	S
23	50	30	S
24	70	25	S
25	70	40	S

TABLE 6. Extinction of conditioning presentation order; Stimulus Intensity—Constant.

Presentation Number	*Sensation Level (db)*	*Time Interval between Presentations (seconds)*
1	30	35
2	30	20
3	30	20
4	30	25
5	30	20
6	30	40
7	30	30
8	30	40
9	30	40
10	30	35
11	30	25
12	30	35
13	30	25
14	30	20
15	30	25
16	30	35
17	30	35
18	30	40
19	30	25
20	30	25
21	30	25
22	30	35
23	30	25
24	30	25
25	30	20

to be conditioned.[2] Further reinforcement with the unconditioned stimulus was then discontinued and the subject was put on the appropriate extinction presentation order (Tables 6 and 7). When two consecutive responses failed to meet the same criteria, extinction was considered complete and the test was discontinued.

Results and Discussion

Only galvanic skin responses which occurred in the extinction period were included for statistical analysis in this study. During this extinction period, it will be recalled, only the conditioned stimulus was presented, with no reinforcement. The responses included for analysis met the criteria of magnitude, slope and latency.

The number of acceptable responses for each subject was entered in a cell for his given Schedule (40% or 100% reinforcement), mode of acquisition (variable or constant intensity), and mode of extinction (variable or constant intensity). The data were subjected to analysis of variance to find out what effect, if any, these variations had upon results.

It will be recalled that this study was designed to answer two questions. The first of these was: *Will resistance to extinction of the conditioned galvanic skin response to a*

TABLE 7. Extinction of conditioning presentation order; Stimulus Intensity—Variable.

Presentation Number	*Sensation Level (db)*	*Time Interval between Presentations (seconds)*
1	50	35
2	70	20
3	70	20
4	70	25
5	30	20
6	30	40
7	30	30
8	50	40
9	50	40
10	70	35
11	70	25
12	50	35
13	50	25
14	50	20
15	30	25
16	70	35
17	70	35
18	70	40
19	70	25
20	30	25
21	50	25
22	50	35
23	50	25
24	50	25
25	70	20

[2]The criteria employed were identical with those described by Stewart (*18*) and Doerfler and McClure (*1*). They were in brief: (1) Minimum GSR amplitude of 5 mm; (2) Minimum GSR slope of 45°; (3) Latency distance of not less than 3 or more than 13 mm, as measured between calibration 'pip' and leading slope of response. Esterline Angus chart speed was ½ inch per 5 sec.

pure tone under partial reinforcement (40%) differ from resistance to extinction under total reinforcement? It can be seen from Table 8 that an *F* value of 4.684 was obtained between the 40% and 100% reinforcement schedules. An *F* ratio of 4.04, with 1 and 48 degrees of freedom, is significant at the 5% level of confidence. Therefore, it would appear reasonable to assume that there exists a difference between the two schedules of reinforcement, whether the intensity during either acquisition or extinction was variable or constant.

The raw data are shown in Table 9. Inspection of these data will show that resistance to extinction is significantly greater with 40% reinforcement than with 100% reinforcement. This finding has certain implications for current clinical use of the GSR in the determination of threshold of auditory sensitivity. Routinely, conditioning is carried out employing 100% reinforcement. If maximum resistance to extinction is to be achieved in the clinical situation, it would appear that there is some advantage in employing partial reinforcement rather than complete reinforcement. The exact percentage of reinforcement remains to be determined, since this study was concerned only with 40% reinforcement. In this connection it should be noted that in current clinical practice, although 100% reinforcement is employed in the conditioning procedure, partial reinforcement of an unknown degree may be employed during the test procedure. This partial reinforcement comes into play when presentation of a pure tone elicits no response, and the question arises as to whether lack of response is due to extinction or to inaudibility of the tone.

The second question raised in this study was: *Will resistance to extinction of the conditioned galvanic skin*

TABLE 8. Complete analysis of variance of scores for eight groups of subjects tested under different conditions.

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*	*Level of Significance*
Between Schedules (40% and 100% Reinforcement)	1,171	1	1,171	4.684	0.05*
Between Acquisition Methods (Constant or variable intensity)	4	1	4	0.016	NS
Between Extinction Methods (Constant or variable intensity)	818	1	818	3.272	0.10*
Interaction: Schedules and Acquisition	32	1	32	0.128	NS
Interaction: Schedules and Extinction	32	1	32	0.128	NS
Interaction: Acquisition and Extinction	208	1	208	0.832	NS
Interaction: Schedules and Acquisition and Extinction	411	1	411	1.644	NS
Within Groups	11,992	48	250		
Total	14,668	55			

*F, 1 and 48 *df*: 5%, 4.04; 10%, 2.84.

TABLE 9. Number of responses to extinction for 56 subjects, by reinforcement ratio, mode of presentation during acquisition and mode of presentation during extinction.

Schedule I (40% Reinforcement)				*Schedule II (100% Reinforcement)*			
Acquisition Constant Intensity		*Acquisition Variable Intensity*		*Acquisition Constant Intensity*		*Acquisition Variable Intensity*	
Extinction		*Extinction*		*Extinction*		*Extinction*	
Constant Intensity	*Variable Intensity*	*Constant Intensity*	*Variable Intensity*	*Constant Intensity*	*Variable Intensity*	*Constant Intensity*	*Variable Intensity*
38	5	31	81	1	6	0	5
19	2	1	12	2	25	0	13
23	13	2	12	10	2	19	4
6	70	11	4	1	10	0	30
19	5	5	54	0	5	4	20
23	2	12	19	2	29	6	9
3	12	18	6	13	27	4	5
131	109	80	188	29	104	33	86

response to a pure tone be affected if the intensity of the tone is varied or is kept constant, both in acquisition and extinction? Inspection of Table 8 will show that an F value of 4.04, with 1 and 48 degrees of freedom, is required for significance at the 5% level of confidence. It would appear, therefore, that there is no basis for assuming a difference between either varied or constant intensity of stimulus in either acquisition or extinction.[3]

Several conditioning studies in the literature concern themselves with the general problem of intensity and its effect on strength of conditioning. Since different measures (chiefly amplitude of GSR) were used to define strength of response, however, it is difficult to relate these experiments to the data here obtained. Grant and Schneider (*5*), for example, in studying the effect of intensity of extinction, found 'no statistically significant effects of CS intensity upon strength of conditioning . . .'

[3]It is of interest, and perhaps of value in further investigation, to note that an F value of 3.272 was obtained between constant and variable intensity in extinction. This value is significant at the 10% level.

Further inspection of Table 8 will show that there was no significant interaction between schedules and acquisition, schedules and extinction, acquisition and extinction, or schedules, acquisition and extinction.

Apart from the statistical treatment of results discussed previously, certain interesting observations emerge from inspection of the data. The two successive intensities at which extinction occurred for the 28 subjects receiving variable intensity during extinction were tabulated. In the extinction order (Table 7) the 30 db tone occurred only once to twice each for the 50 db and 70 db tones, and in only one place in the order could two 30 db tones occur successively. One would expect that extinction would occur more often at the 50 and 70 db intensities than at the less frequent 30 db intensity. Yet it appeared that more than the expected ratio of extinction responses included at least one of the 30 db tones. No statistical analysis is planned, since the original design did not provide for equalization of presentation of the different intensities. It should be kept in mind,

however, that half of the subjects receiving variable intensity during extinction were conditioned to constant intensity at a level of 30 db. This fact may complicate any simple interpretation of this observation.

In Hovland's 1937 study (*10*) on the strength, spontaneous recovery and disinhibition of conditioned and of generalized responses in humans, in which pure tones were used as the conditioned stimuli, it was noted that on the first test trials, subjects responded to the novel stimulus with as large responses (in magnitude) as were given to the conditioned stimulus. In the present study a similar finding was made. After all testing was completed and extinction had been reached, 53 of the 56 subjects were presented with tones of 500 and 4000 cps at 30 db re normal threshold to explore the possibility of generalization to the new frequencies. Of the 53 subjects, 43 responded acceptably to either or both the new tones, while 10 did not respond acceptably to at least one of them.[4] Of these 10, seven were in the group which received 100% reinforcement during acquisition of conditioning. It would appear more reasonable to expect greater generalization from the group which received partial reinforcement than from the group which received complete reinforcement, if we are to follow the reasoning of Humphreys (*15*) and others. Generalization to frequency has not been shown to be as dependable, however, as generalization to intensity (*8, 9*).

The number of responses to extinction (two successive non-acceptable responses) for each subject, and the first failure of a response to meet the amplitude-slope-latency requirements set up for acceptability, were also recorded. Analysis of these data shows a product-moment correlation coefficient of 0.875 between these first failures and extinction in the group which received 40% reinforcement. This correlation is significant at better than the one per cent level of confidence.

It would thus appear that some relationship exists between the occurrence of a subject's first failure and his subsequent extinction. Because of the wide range of scores, the meaning of this for clinical application is not clear.

The number of stimuli required for each subject to meet the conditioning criterion of three successive acceptable responses was noted. So far as acquisition of conditioning was concerned, there appeared to be no significant difference in the number of presentations required by the 100%-reinforced group and the number required by the 40%-reinforced group.

Examination of the individual chart records was made in order to determine if non-acceptability was due to failure to meet the latency requirement or the amplitude-slope requirement. It became evident that one could not separate these two criterion elements.

Summary

The galvanic skin response in 56 subjects with normal hearing for 1000 cps was conditioned to a pure tone auditory stimulus, using electric shock as the unconditioned stimulus. Objective criteria for designation of responses included determination of latency, minimum amplitude and slope. One-half (28 subjects) of the group received 40% reinforcement with the unconditioned stimulus; the other half received 100% reinforcement. Half of each sub-group (14 subjects) was conditioned with a con-

[4]It should be noted that no information is available as to each subject's auditory sensitivity at 500 and 4000 cycles.

stant intensity of 30 db re normal threshold; the other half was conditioned with a variable intensity (30, 50 and 70 db re normal threshold). Reinforcement was then discontinued. One half (seven subjects) of each sub-group was extinguished at constant intensity of 30 db re normal threshold; the other half was extinguished at variable intensity (30, 50 and 70 db re normal threshold).

Results indicated that a statistically significant difference existed in number of responses to extinction between the 40%-reinforced group and the 100%-reinforced group, in the direction of greater resistance to extinction by the 40%-reinforced group. No statistically significant difference was found to exist in the number of responses obtained by different modes of acquisition or extinction.

Clinical implications of these findings are discussed, along with suggestions for fruitful further research.

References

1. Doerfler, L. G. and C. T. McClure. The measurement of hearing loss in adults by galvanic skin response. *JSHD*, 19, 1954, 184-189.
2. Girden, E. The galvanic skin response, 'set,' and the acoustical threshold. *Amer. J. Psychol.*, 65, 1952, 233-243.
3. Grant, D. A., D. R. Meyer and H. W. Hake. Proportioned reinforcement and extinction of the conditioned GSR. *J. gen. Psychol.*, 42, 1950, 97-101.
4. Grant, D. A. and J. J. Schiller. Generalization of the conditioned galvanic skin response to visual stimuli. *J. exp. Psychol.*, 46, 1953, 309-313.
5. Grant, D. A. and D. E. Schneider. Intensity of the conditioned stimulus and strength of conditioning: II. The conditioned galvanic skin response to an auditory stimulus. *J. exp. Psychol.*, 39, 1949, 35-40.
6. Hardy, W. G. and J. E. Bordley. Special techniques in testing the hearing of children. *JSHD*, 16, 1951, 122-131.
7. Hardy, W. G. and M. D. Pauls. The test situation in PGSR audiometry. *JSHD*, 17, 1952, 125-148.
8. Hovland, C. I. The generalization of conditioned responses: I. The sensory generalization of conditioned responses with varying frequencies of tone. *J. gen. Psychol.*, 17, 1937, 125-148.
9. ———. The generalization of conditioned responses: II. The sensory generalization of conditioned responses with varying intensities of tone. *J. genet. Psychol.*, 51, 1937, 279-291.
10. ———. The generalization of conditioned responses: III. Strength, spontaneous recovery and disinhibition of conditioned and of generalized responses. *J. exp. Psychol.*, 21, 1937, 47-62.
11. ———.Human learning and retention. In Stevens, S. S., ed. *Handbook of Experimental Psychology*. New York: John Wiley, 1951.
12. Humphreys, L. G. Generalization as a function of method of reinforcement. *J. exp. Psychol.*, 25, 1939, 361-372.
13. ———. Effect of random alternation of reinforcement on the acquisition and extinction of conditioned eyelid reactions. *J. exp. Psychol.*, 25, 1939, 141-158.
14. ———. Acquisition and extinction of verbal expectations in a situation analogous to conditioning. *J. exp. Psychol.*, 25, 1939, 294-301.
15. ———. Extinction of conditioned PGSR following two conditions of reinforcement. *J. exp. Psychol.*, 27, 1940, 71-75.
16. Stanley, W. C. Extinction as a function of the spacing of extinction trials. *J. exp. Psychol.*, 43, 1952, 249-260.
17. Stewart, K. C. A new instrument for detecting the galvanic skin response. *JSHD*, 19, 1954, 169-173.
18. ———. Some basic considerations in applying the GSR technique to the measurement of auditory sensitivity. *JSHD*, 19, 1954, 174-183.
19. White, C. T. and H. Schlosberg. Degree of conditioning of the GSR as a function of the period of delay. *J. exp. Psychol.*, 43, 1952, 357-362.

A Speech Reception Threshold Test For Children

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MEASURING the threshold of hearing for speech in children is a problem that often is not adequately solved by existing audiological tests. The Ewings (*5*) described three- to five-year-old children as able to participate actively in hearing testing. An examiner must use speech signals of known acoustic values, however, which children recognize or can easily be taught to recognize, and he must obtain voluntary responses which can be judged as evidence of hearing in order to do adequate subjective testing.

Tests using spondee words and pictures have been described for nursery school children (*11*) and for selecting hearing aids for children (*14*). Bennett (*1*) described a recorded screening test for six-year-olds which apparently is very similar to the recorded word-picture test distributed by a manufacturer of audiometers and hearing aids (*10*). Keaster's test used pictures and short verbal commands related to the pictures (*9*). Other procedures are to ask the child to identify familiar objects or small toys whose names may be spondee words (*12, 17*), to point to parts of his body or clothing, or to repeat randomly spoken numbers or 'selected' spondee words. A resume of considerations when testing children was given by Morley (*13*) who also mentioned a technique similar to some above.

Of necessity many of these test procedures use a limited vocabulary which does not adequately sample speech sounds, and which does not necessarily meet the important criterion of homogeneity of audibility for a good threshold test. For example, although the standard threshold tests use spondee words selected to be homogeneous in audibility (7) this is no assurance words in another list of spondees also will be homogeneous. Careful selection of test materials, including audibility considerations, is as advisable for children as it is for adults. Asking a child to point to simple pictures seems an appropriate testing procedure. There are many words for which pictures can be found, the pictures can be of familiar objects, and looking at pictures and talking about them with an adult is an activity common to most

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children. The activity facilitates rapport, stimulates responses apparently related to level of hearing acuity, holds a child's interest, and keeps the child in a relatively sedentary position. In view of these advantages development of a formalized picture identification test was attempted (*15*) and given clinical evaluation.

Test Development

In accordance with accepted criteria for threshold tests (*8*), test items were selected to be familiar, phonetically dissimilar, representative of speech sounds, and homogeneous in basic audibility. Monosyllabic nouns from among the first 500 words in Rinsland's basic vocabulary list (*16*) for which pictures could be found were selected. In addition, some words were taken from the second 500, and a few additional words which observation indicated children knew were added to the list. (Even though monosyllables might be less suited than polysyllables for a threshold test, they were used because of the larger number for which pictures can be found.) For the 107 words selected, corresponding brightly colored simple pictures without backgrounds were collected, mounted on cards, and randomly arranged into

TABLE 1. Relative audibility of selected words.*

Selected Words	*Number of Times Missed by 25 Auditors*	*Audibility Category*
bear, bread, show, tie	1	
cap, car, chair	2	
swing	3	
cake, hair, *hands*, *plane*, *socks*, *truck*	4	A
cow, *dog*, *door*, *pie*, *stove*	5	
blocks, *eyes*, owl, shirt, *train*, *tree*, *watch*	6	B
key, *milk* (bottle and glass)	7	
doll, *dress*, eggs, *house*, *kite*, *knife*, *spoon*	8	
bus, duck, *flag*, *hand*	9	C
bed, *boat*, *gum*, *hat*	10	
comb, *cup*, *gun*, lamp, *man*	11	
skates	12	D
clock, *clown*, *drum*, *mouse*, *pants*	13	
ball, *fish*, leaf	14	
cat, *corn*, *horse*, soup	15	E
frog, *lamb*, *top*	16	
bird, pig, sun	17	
feet, fork	18	
girl	19	
face, mouth	21	
light	22	

*Italicized words are those whose picture recognition by 40 children showed no errors or hesitations.

groups of five or six. The picture groups were presented to 25 children between 2-7 and 6-0 with normal hearing and intelligence. Each child was asked to 'Point to the ——.' Precaution was taken so pictures would not be identified by elimination of those previously asked. Pictures not identified three or more times were eliminated and the remainder were presented in a like manner to 15 children between 4-0 and 8-0 who were candidates for a school for the deaf or were enrolled in such a school. Those pictures not identified two or more times were eliminated.

The remaining 73 words were put into groups of five or six and one of the authors recorded them on discs at constant intensity with the carrier phrase, 'Point to the ——.' A 1000-cps calibrating tone was recorded at the speech monitoring level. The recorded word-picture groups were administered to 10 normal hearing kindergarten children and 15 young adults under earphones as a picture identification test at individual thresholds for the calibrating tone. The number of times each picture was not pointed to in response to its name is indicated in Table 1.

Words showing hesitation or uncertainty in being recognized on the preliminary recognition tests and words missed either infrequently or very often during the recorded test were not considered further. From the remaining words, italicized in Table 1, we selected groups of five words each from each audibility category. Some words were used in both groups if necessary. Three words from category C were used with words in B to avoid frequent repetitions. Care was taken to avoid phonetic and picture similarity among words of a group. One group from each category was selected at random and the five groups made up Picture Identification Test Form A as indicated in Table 2; the remaining five groups made up test Form B. Six practice word-pictures from among the various audibility categories were selected for each test form.

The picture groups were mounted on 16″ by 18″ poster cards with no relationship to each other except to give an orderly appearance. The

TABLE 2. Word-picture groups for test forms A and B.

Form A	*Form B*	*Approximate Audibility Category*
cake	cow	
dog	door	
hands	pie	A
stove	plane	
truck	socks	
eyes	blocks	
key	doll	
milk	knife	B
spoon	tree	
train	watch	
bus	bed	
dress	boat	
flag	gum	C
house	hand	
kite	hat	
clock	clown	
comb	comb	
cup	gun	D
drum	man	
mouse	skates	
ball	corn	
cat	fish	
fish	frog	E
horse	lamb	
top	top	
Practice Items	*Practice Items*	
bread	car	
cap	chair	
car	dog	
chair	pig	
pants	shoe	
tie	swing	

poster cards for a given test form were arranged so that the practice items were on top, audibility group A was next, and groups C, E, D, and B followed in that order. This arrangement was made in order to avoid regular progression in presenting audibility groups. The cards were attached together with rings for ease in handling and numbered according to presentation order. A table of random numbers was entered to select picture-words in each test group to present aurally during the test to reduce the effect of picture identification by elimination. All five pictures were selected in one group only. A word was not allowed to follow itself because of difficulty in judging a child's response to a repeated word. A sheet similar to Table 3 proved convenient for the test protocol and scoring sheet.

The child to be tested was seated in a sound room at an appropriate distance from a loud speaker with one of the test forms before him. An assistant examiner sat beside the child to handle test cards and signal responses. The examiner acquainted the child with the procedure, and used a speech audiometer with live voice to explore for approximate threshold using the practice items. The practice card was turned and the first item in the first group of test words was called at 10 to 15 db above estimated threshold. (The carrier phrase, 'Point to the——,' is appropriate, although other phrases were used if they seemed to better suit the child.) The child's response was noted on the scoring sheet. Five db attenuation was introduced and the second word in the group was called. After calling all five words in the group, attenuating five db after each word, the card was turned. The second group of words was called in a similar manner beginning at the same intensity level as the first word in the first group. The procedure was repeated for all

TABLE 3. Example of test protocol and scoring sheet.

Practice Items	*Attenuation*	*Picture Card Sequence* I	II	III	IV	V	*Total Correct*
Form A:							
chair	0 db _____	hands	house	horse	clock	eyes	_____
tie	5 db _____	dog	flag	ball	mouse	train	_____
car	10 db _____	truck	dress	cat	drum	milk	_____
bread	15 db _____	stove	bus	fish	cup	eyes	_____
cap	20 db _____	hands	kite	ball	clock	spoon	_____
pants							
Form B:							
shoe	0 db _____	door	bed	lamb	skates	tree	_____
dog	5 db _____	pie	boat	corn	clown	knife	_____
chair	10 db _____	cow	hand	top	comb	doll	_____
car	15 db _____	socks	gum	lamb	gun	tree	_____
swing	20 db _____	pie	bed	frog	clown	blocks	_____
pig							

five groups of words in the test form.[1]

Starting each group of words at the same level gave five words at each intensity. Although the words at each intensity were heterogeneous in audibility, they were equal in range and average audibility to the five words at each other intensity level. We adapted the intensity for 50% correct identification, determined by an articulation curve, at threshold.

Test Reliability and Validity

Twenty-four normal-hearing university students and six audiology clinic patients with various types and degrees of hearing loss were tested with PAL test No. 9 and with both forms of the present test using live voice. Mean threshold on Picture Identification Test Form A was essentially equal to the threshold on Form B (Form A threshold 0.1 db more intense than Form B threshold). An r of .97 was found between individual scores on Forms A and B. PAL test No. 9 mean threshold was 9.9 db more intense than mean threshold for Form A and 10.0 db more than for Form B (both differences significant beyond the 2% level). Correlations of .95 and .94 were found between test No. 9 scores and Forms A and B respectively.

The Picture Identification Test Forms A and B were also given to 42 children between 3-11 and 12-0. The children were selected to have at least normal intelligence and thresholds for 500, 1000, and 2000 cps at 10 db or better in both ears, and no thresholds poorer than 15 db for other audiometer octave frequencies. Median age of the group was 6-4 and mean hearing loss for pure tones (better ear average for 500-2000 cps (2) was -0.1 db). All testing was done over a period of one week using the same equipment throughout and the same intensity levels for testing each child with the Picture Identification Test.[2] The total number correct responses by the 42 children to both forms of the test at each intensity was used to determine a smooth curve of best fit. The curve changed from 20% to 80% in 7 db and reached 0% and 100% about 12.5 db on either side of the 50% level. A template was used to determine individual thresholds to the nearest 0.5 db.[3] The mean threshold on Form B was about 0.5 db more intense than on Form A(σ_D .3, C.R. 1.35; probability of M_A less than M_B .09). Although accepted statistical significance was approached, the difference is well within the usual testing error for auditory threshold. Differences between thresholds on Forms A and B were equal to or less than 2.5 db for 76% of the children, 3 db for 86% of the children, and 3.5 db for all of the children except one who had a difference of 5 db. The standard deviations of thresholds on the two test

[1]It was found that by attenuating within each group of words the child's attention and interest was more easily held throughout the test. As he was given each new set of pictures the first word was at an intensity which caught his attention and assured at least one successful response within each group.

[2]While collecting these data we observed a probable trend for better pure tone and speech thresholds for older children. Because both thresholds appeared to change in very nearly the same manner as a function of age, such an effect is not critical to consideration of relationships between speech reception and pure tone thresholds. The trend suggests thresholds norms should be established for children of different ages.

[3]The alternate scoring method of subtracting the total number of correct responses from the starting db level and adding 2.5 db can be used.

TABLE 4. Relationships (r) between pure tone average hearing loss and picture identification test threshold.

Subjects	*N*	*Form A*	*Confidence Limits at 1% Level**	*N*	*Form B*	*Confidence Limits at 1% Level**	*N*	*A and B Combined*	*Confidence Limits at 1% Level**
Normal	42	.39	.00 to .61	42	.47	.09 to .73	42	.51	.14 to .75
Hearing loss	29	.90	.75 to .96	36	.91	.79 to .96	15	.90	.56 to .98
Hearing loss							50	.98†	.96 to .99

*Obtained by r to z transformation.

†The best estimate of Picture Identification Test threshold was used. For subjects with both Form A and Form B thresholds a total possible 10 items at each intensity was considered; if only a Form A or Form B threshold was available it was used.

forms can be considered to be equal (σ_A 2.6; σ_B 2.5) and are consistent with distributions found on other speech reception threshold tests (*4*). The product moment correlation between threshold scores on Forms A and B was .71 (1% confidence limits at .86 and .44). The standard error of estimate for predicting threshold on Form B from Form A (or vice versa) was 1.8 db.

The Picture Identification Test was given to 50 children between 4 and 12 years of age with dull normal or better intelligence. The range of their 500-2000 cps better ear averages was -1.7 to 65.0 db with a mean of 28.0 db; median age of 8 years. Twenty-nine were tested with Form A and 36 with Form B. For the 15 children tested with both the difference between test form means was 0.5 db (M_A less than M_B ; σ_D .8). Six had differences between A and B thresholds of 2.5 db or less, 11 had differences of 3.5 db or less, and 14 had differences of 5 db or less; the remaining case had a difference of 6.5 db. The relationships between test form thresholds for this and the previous two groups of subjects indicate the two forms are essentially equal. Product moment correlations between pure tone better ear averages and Picture Identification Test thresholds for the 50 hearing loss and 42 normal cases are indicated in Table 4. The low r values for the normal hearing group would be expected because of the limitation to subjects having pure tone average losses at 10 db or less. The high r values for the hearing loss group compare favorably with the relationships between pure tone loss and spondee thresholds reported by Carhart (*3*) and Harris (*6*), and indicate a close relationship between thresholds for pure tones and speech as measured by the Picture Identification Test. The linearity of the relationship for the hearing loss group was demonstrated by a scattergram and computed line of best fit using the speech reception threshold on Form A, Form B, or both combined, whichever was available. The r of .98 gave a standard error of estimating Picture Identification Test threshold from pure tone average of 2.6 db (obtained Picture Identification Test threshold $\pm$2.6 db of the predicted threshold two-thirds of the time using the prediction formula P.I.T. threshold = .81 pure tone average +7.1). The standard error of

predicting pure tone average from P.I.T. threshold was 3.1 db.[4]

Summary

A speech hearing threshold test using a picture identification technique with carefully selected stimulus words and pictures for children as young as three or four years is described. The test meets the criteria of an acceptable speech threshold test, meets the special needs of a test for children, has a close relationship with spondee threshold for a group of adults, and high correlation with pure tone average hearing loss for a group of children. The two forms of the test are essentially equal. Our experience with the Picture Identification Test has indicated its usefulness to the clinical audiologist.

References

1. Bennett, S. A group test of hearing for six-year-old children. *Brit. J. educ. Psychol.*, 21, 1951, 45-52.
2. Carhart, R. Monitored live voice as a test of auditory acuity. *J. acoust. Soc. Amer.*, 17, 1946, 339-349.
3. ———. Speech reception in relation to pattern of pure tone loss. *JSD*, 11, 1946, 97-108.
4. Davis, H. The articulation area and the social adequacy index for hearing. *Laryngoscope*, 58, 1948, 761-778.
5. Ewing, I. R. and A. W. G. Ewing. *Opportunity and the Deaf Child*. London: Univ. London Press, 1947.
6. Harris, J. Free voice and pure tone audiometry for routine testing of auditory acuity. *Arch. Otolaryng., Chicago*, 44, 1946, 452-467.
7. Hirsh, I. J., et al. Development of materials for speech audiometry. *JSHD*, 17, 1952, 321-337.
8. Hudgins, C. V., et al. The development of recorded auditory tests for measuring hearing loss for speech. *Laryngoscope*, 57, 1947, 47-89.
9. Keaster, J. A quantitative method of testing the hearing of young children. *JSHD*, 12, 1947, 159-160.
10. Maico RS group audiometer test. Minneapolis: Maico Co. Inc.
11. Meyerson, L. A verbal audiometric test for young children. [abstract] *Amer. Psychologist*, 2, 1947, 291.
12. Monsees, E. K. Children's auditory test. Washington, D. C.: Volta Bureau, 1953.
13. Morley, D. E. Rationalism in testing the hearing of children. *Volta Rev.*, 50, 1948, 468-478.
14. Olsen, F. and M. Soissons. Problems in the selection of hearing aids for children. *Volta Rev.*, 50, 1948, 478-484.
15. Pearson, J. A speech reception test for young children. M.A. Thesis, Univ. Mich., 1951.
16. Rinsland, H. *A Basic Vocabulary for Elementary School Children*. New York: Macmillan, 1945.
17. Sortini, A. J. and C. G. Flake. Speech audiometry for pre-school children. *Laryngoscope*, 63, 1953, 991-997.

[4] In a master's thesis in progress at The Pennsylvania State University, William Mullen found an *r* of .93 between pure tone average threshold and Picture Identification Test threshold for a group of 54 normal, articulatory defective and hearing handicapped children.

An Investigation Into The Use Of Electro-Mechanically Delayed Side Tone In Auditory Testing

Clair N. Hanley
William R. Tiffany

LEE (*3, 4, 5*) and Black (*1*) have recently drawn attention to the influence on a speaker of a simultaneously monitored delayed speech side tone and, together with Flanagan (*3*), Neely (*6*), Tiffany and Hanley (*7*), and others have made a few preliminary investigations into both the theoretical implications and practical applications of the so-called 'delayed feedback,' or 'delayed side tone' phenomena.

Lee (*3*) notes that under the influence of a delayed side tone 'the subject slows down and raises his intensity, or, attempting to maintain normal speed . . . halts or repeats syllables and continuant sounds.' He calls attention (*5*) to the fact that 'the effect on speech is involuntary and induced with little or no regard to previous conditioning or the subject's will to oppose the influence of the feedback.' Lee further suggests (*5*) that the effect is critical with respect to volume of feedback and amount of delay of the side tone.

Black has tested the assumption that the feedback effect is critical with respect to the amount of delay and has found that a delay of .18 second has resulted in the greatest reduction in oral reading rate.

Tiffany and Hanley (*7*), using a delay time of .14 second, have investigated the variable of side tone intensity over a limited range with the conclusion that reading rate reduction is a positive function of intensity. They found that differences between normal reading rate and reading rate under the experimental 'delay' condition were significant for all levels tested (35, 55, and 75 db above speech threshold).

With respect to the possible clinical applications of delayed side tone phenomena preliminary work has been reported on applications in the field of stuttering (*6*) and on the use of the phenomena in the detection of malingering and psychogenic deafness (*7*).

Studies of the side tone phenomena thus far reported have used change of reading rate as the primary criterion of the influence of delay on a reader. According to Lee (*3*) '. . . while the artificial stutter is the most striking reaction it is the less spectacular speed governing effect which probably will provide the most useful information.' The present study has been undertaken to provide additional information on this point while at the

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same time it attempts to: (1) observe the responses of subjects to side tone levels over the lower range of intensities, from 10 to 50 db above threshold, and (2) gather additional information on the use of the delayed side tone as a means for the detection of malingering and psychogenic deafness.

Specifically, the present study was undertaken for the purpose of assessing the reliability of a new technique of measuring speech breakdown which would utilize all cues available in the affected speech. It was desired to present recorded test results to a panel of judges in order to determine the feasibility of using a judgmental technique in the detection of responses to delayed speech feedback.

Procedure

To investigate the intensity function under conditions of side tone delay, five levels of delayed side tone, 10, 20, 30, 40, and 50 db, were presented to five randomly selected experimental groups of 10 normal hearing adult readers while 50 normal hearing readers acted as a control group. The control group read an identical prose passage under the same conditions and instructions but without electro-mechanically introduced side tone delay. All readings were timed and one experimental and one control reading for each subject was recorded. Subjects and intensity and experimental orders were randomly assigned. Normality of hearing was determined by a speech hearing test using spondee words.

Nine judges, from among the faculty of the Speech Department of the University of Washington, rated each pair of recordings according to whether or not they believed one had been made under conditions of delayed side tone. The judges had participated in an hour's training on delayed side tone phenomena and were instructed to use all available cues in selecting the appropriate reading of a pair as the 'influenced' reading.

To investigate the use of the phenomena as a test of malingering, instructions to the readers were designed to encourage them to 'beat the test,' i.e., to appear unaffected by the delayed side tone.

Subjects and Equipment. All subjects, chosen for absence of ear symptoms or pathology, were young adults from college classes at the University of Washington and were naive with respect to hearing testing methods in general and delayed side tone effects in particular. In the group of 100 subjects, 51 were males, 49 females.

A two-room testing set-up was employed. In a sound proofed room was located the subject's microphone, the earphones necessary to deliver the delayed side tone, and appropriate signaling and talk-back equipment. In the control room was located a Presto RC 10/24 tape recorder, capable of providing a delay time of .14 seconds. The output was fed to the speaker-listener's phones by means of an amplifier-attenuator system which allowed for attenuation in one decibel steps over the intensity ranges studied. Playback equipment for the judging consisted of the same tape recorder fed to a McIntosh 20 W-2 amplifier and an Electrovoice SP-12 speaker in a folded horn corner cabinet enclosure in a university classroom.

Recording. After establishing a spondee threshold, each subject was required to read a short paragraph of neutral descriptive prose five times. These included two practice readings followed in order by: (1) a timed reading under normal conditions, i.e.,

without artificial side tone delay, (2) a timed reading under the influence of delayed side tone, and (3), a second timed 'normal' reading. Two normal readings were employed to obtain an estimate of constancy of reading rate against which differences attributable to the side tone delay could be evaluated.

For rating purposes two of the three readings were recorded, the experimental and one of the control readings. The serial order of presentation within pairs was randomized. If, for a given subject, the order was determined to be 'non-delayed-delayed' the first control reading was recorded followed by the reading with side tone delay. If the opposite order was desired the side tone reading was recorded first, followed by the second of the two control readings. This procedure involves the assumption that no differences obtain between the two normal readings. Although the assumption was based upon previous findings by the present writers (7), it may be called into question on the basis of the present results. The method employed did provide a convenient way of preparing tape recordings for subsequent analysis by the judges.

The first timed reading by the subject was preceded by instructions requesting him simply to read the passage 'in your normal manner.' Prior to the first reading under the 'delay' condition standardized instructions were given which included the following:

> . . . We are going to ask you to read the same passage again, pretending to be totally deaf. You should realize that if you are deaf, you could not be disturbed by any sound coming from the earphones. Therefore, you will try to read the passage this time in exactly the same way you read it before. If your reading is noticeably different we will suspect that you have been affected by something heard in the earphones. That is, this is a test to detect faked deafness which you are going to try to 'beat.' . . .

Despite the instructions, one-half of the subjects heard nothing in the earphones during this reading, whereas the other half heard delayed side tone at the predetermined randomly assigned level. This reading was always recorded either as the first or the second of each recorded pair. The final reading, i.e., the second of the normal readings, was again preceded by instructions to read 'in a normal manner' and was recorded only where appropriate for the judging sequence.

Judging. After the initial instructional period had been completed each judge was furnished with 100 ballots and a ballot box. Each ballot provided three possible choices: (1) first reading with delayed side tone; (2) second reading with delayed side tone; and (3) neither reading with delayed side tone. Judges were told that in each case one reading was a 'normal' reading and that the other reading might or might not be influenced by the delayed side tone.

The above experimental procedure yielded two types of data: (1) rate measures on three readings, and (2) ratings on each pair of recorded readings.

Results

Table 1 presents the results of the rate measurements. In this table 'Mean Rate Reduction' represents the difference between the number of seconds required for Reading One (control reading) and Reading Two (experimental reading).

The data of Table 1 tend to indicate that decreases in reading rate are positively associated with level of delayed side tone, at least over most of the range studied. It should be noted that at the no-side tone level a nega-

TABLE 1. Mean rate reductions and error estimates at successive side tone levels.

	Level of side tone in db					
	0	*10*	*20*	*30*	*40*	*50*
Number of subjects	50	10	10	10	10	10
Mean rate reduction	–.57	.50	2.18	3.40	7.52	5.40
S.E. of mean	.032	.229	.286	.238	.428	.407

tive mean value was obtained. This shows that a decrement in reading time occurred for a subsequent normal reading of the same material. The increased reading time for experimental readings even at the faintest of side tone levels is seen as a noticeable reversal of this trend. The immediate rise in reading time takes place despite the reports of some subjects that they were relatively unaware of the delayed side tone and were in no way disturbed by it.

Not only was there a reading time decrease for a 'normal' reading immediately following the initial control reading but also there appeared to be a tendency for Reading Three, the control reading following the experimental condition, to be faster than Reading One. This difference was statistically significant for the 50, 30, and zero db levels. This finding appears contrary to that of Tiffany and Hanley (7) and Black (*1*), who found that 'the effects of the side tone carried over and affected the fluency of the readers . . . '

Table 1 shows a slight tendency for the variability among subjects to depend upon the level of the feedback. There is some suggestion from this table that the standard error of the mean of the difference scores between Readings One and Two increases as a positive function of side tone level. These differences, however, were not statistically significant.

Of particular interest to those concerned with the detection of malingering or psychogenic deafness is the number of those readers who did not hear the delayed side tone but who nevertheless appeared to read significantly slower on the second reading. To a limited degree this may approximate the case of the suspected malingerer who actually does not hear an artificially induced side tone delay but who nevertheless appears to read significantly slower on the second reading. There were 12 readers who showed more than a 0.5 second rate reduction at this condition. This is the average rate reduction time for those who read with a delayed side tone at the level of 10 db. In contrast, only one control reader showed more than a two-second reduction. This was the average time of delay for those receiving 20 db of feedback. For this one case the delay was 2.4 seconds.

Referring again to Table 1 it will be noted that the trend toward reduced rate shows a reversal above 40 db. In a previous study (7) a similar inflection point was found at a level somewhat higher (55 db). It is logical to suppose that a leveling-off would occur at higher intensities; however, the exact nature of such a process awaits future investigation.

Table 2 presents the results of the statistical analysis carried out for the purpose of assessing the significance of the differences among the mean rate

TABLE 2. Analysis of variance among mean rate reductions.

Source of Variation	*df*	*SS*	*MS*	*F*
Between readings	5	777.70	155.54	25.96*
Within readings	94	562.83	5.99	
Total	99	1340.53		

*Significant beyond .1 per cent level of confidence.

reductions of Table 1. Analysis of variance yielded an F ratio of 25.96 which, with five and 94 degrees of freedom, allows for the rejection of the null hypothesis at better than the .001 level of confidence. Thus the differences among the means were highly significant.

Tests were used to determine the lowest level of delayed side tone which would produce a mean rate reduction significantly greater than that associated with the control condition. Only two tests were made: the t for the zero to 10 db difference was found to be 1.813 which, with 58 degrees of freedom, is considered significant at about the three per cent point. The t-test for the zero to 20 db difference yielded a value of 4.362 which, with 58 degrees of freedom, is significant beyond the one per cent point.[1]

Figure 1 presents, in graphic form, the results of the ratings. For the solid line, the ordinate represents per cent correct identification of the condition indicated along the abscissa. A correct identification is made when a majority of the judges select a correct reading as being an example of the delayed side tone condition. For example: of the 10 pairs of readings at the 10 db side tone level there was a majority decision as to the presence of the side tone on only two of the 10 pairs of readings. From Figure 1 it will be seen that correct identification is a positive function of the level of feedback.

Not only does the number of correct identifications increase with level of feedback but also the agreement among judges increases, i.e., the size of the majority increases on each vote. The average size of this majority varied from 67 to 100 per cent. This trend is shown by the dotted line of Figure 1.

In order to simplify some of the presentations of Table 1 and Figure 1, Table 3 has been prepared. This table

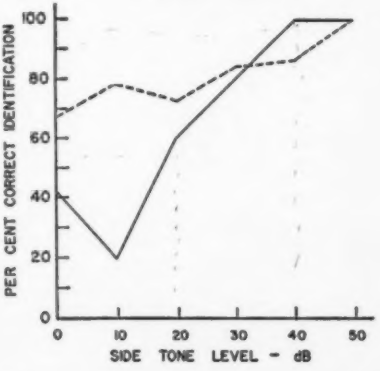

FIGURE 1. Curves showing the relationship between listener judgment of delayed side tone effect and level of the side tone. The solid line represents the percentage of the total number of subjects at each level who were correctly identified by the judges. The dotted line indicates the average proportion of judges voting with the majority on each correct selection.

[1]It should be noted that these t-tests are 'one-tailed' tests for the reason that the mean delay for the experimental condition is hypothesized only to be *greater than* the mean delay for the control condition.

TABLE 3. Comparison of the number of readers correctly identified on the basis of rate measures with the number correctly identified by the judges.

Level of feedback	*Number of readers*	*Number of readings correctly identified by the rate measure*	*Number of readings correctly identified by the judges**
0 db	50	49	21
10 db	10	1	2
20 db	10	7	6
30 db	10	7	8
40 db	10	9	10
50 db	10	8	10

*For the 0 db level a 'correct' identification means either that the judges agreed there was no feedback or that they did not agree as to which reading was the feedback reading. For the other conditions a correct identification required that majority opinion coincide with the actual feedback reading.

shows the number of readers who were correctly identified for each experimental condition and compares the results of the time measures with the results of the judges' ratings. For the control condition, 21 of the 50 readers were correctly identified by the judges whereas 49 out of 50 were correctly determined by means of the time measure. At the 10 db level only one person was correctly identified by the time measure (i.e., had over two seconds rate reduction for Reading Two) and only two on the judgemental measure (correctly judged by five out of nine judges). At the 20 db level seven out of ten were identified with the time measure and six out of ten by the judgemental technique, etc.

Discussion

The present study has reinforced former tentative conclusions that the degree of response of the speaker-listener to simultaneously monitored delayed side tone varies as a function of intensity. As to the level at which the effect takes place, under the conditions studied there seems to be some slight effect for side tone levels as faint as 10 db above threshold. There is apparently no sharply defined point at which the effect of speech breakdown takes place but on a statistical basis 20 db of feedback gives highly reliable indications of slowing of speech rate in the average subject. At this level not only is the slowing in oral reading rate significant but also a majority of the readers are correctly identified by a panel of judges, presumably from cues which include rhythm disturbances, voice quality changes, etc., as well as rate changes.

One somewhat surprising finding of the study was that, in certain respects at least, judgments of over-all effects of speech breakdown are no better than rate measures alone. At the higher intensities of delayed side tone, however, the listener judgment appears to be more valid. At 40 and 50 db there was 100 per cent correct selection by the panel of judges.

For use as a clinical tool the incorrect judgments are as important as the correct ones. The results of the listener judgments seem to show that the judges' anticipatory set leads them to label many readings as influenced by side tone which are not so in fact. This has resulted in judgments which

were apparently based on nothing more than 'normally poor' reading. It would seem likely that more highly trained judges and different instructions could effectively reduce this error.

As an informal sidelight to this experiment one of the writers acted as a tenth judge in order to test the effects of more experience. Although his judgments may be questioned from the standpoint that he participated in the recording procedures he was not aware that prior knowledge played any part in his selections. He made only six wrong selections at the control condition as opposed to an average of 29 by the rest of the judges, whereas at the experimental conditions his judgments compared favorably with those of the panel.

Insofar as a general statement can be made from these data for the person interested in testing for malingering and/or psychogenic deafness, the indicated advice may be as follows: In the critical case, decision as to the presence or absence of 'delayed side tone' effects should be made both on the basis of rate changes and judgment by expert listeners. Then, if the person tested actually 'hears,' feedback effects may be expected to show up reliably at from 20 to 30 db above his threshold. At this point, a delay of about eight per cent may be expected on the average. Results of near perfect consistency can not be expected until 40 to 50 db above threshold. If there is a reliable slowing in rate, hearing may be strongly suspected. Not all readers, however, will display this effect.

Individual differences in resistance to speech breakdown seem quite marked, especially in the mid ranges. The recordings reveal that some readers are markedly affected, in rate as well as rhythm, at levels as low as 10 to 20 db. On the other hand, the occasional speaker appears relatively undisturbed even at high intensities of feedback. Such differences would appear to point toward a fruitful field for future investigation.

In conclusion, the authors would like to point to considerable success in the employment of delayed feedback as an 'objective hearing test' under actual clinical conditions. Used with care and in conjunction with other tests it has been employed in the detection of four or five cases of psychogenic deafness over a one and one-half year period. These have included two adolescent girls who were 'feigning' moderate to severe bilateral hearing losses but who showed marked speech breakdown at about 30 decibels of delayed feedback, and two veterans referred for hearing aids. One of these veterans came to the clinic wearing his aid turned to full volume and showed no measurable pure tone response. He evidenced marked speech breakdown at about 40 db of feedback. His loss was tentatively diagnosed as psychogenic and he was referred for treatment through proper channels. The second veteran showed a 95 db average loss for pure tones but possible response to delayed feedback at 50 db and probable response at 60 db. He too, was referred through proper channels for medical reappraisal.

In a number of instances the delayed side tone test has been used as an adjunct to other tests to rule out the possibility of psychogenic overlay. The experience of the writers has been that, used in a common sense and careful fashion, the delayed side tone test can be of substantial help in the hearing clinic.

Summary

The foregoing study was made for the purpose of gathering additional

data on the response of normal subjects to delayed speech side tone as a function of intensity. A second purpose of the study was to assess the reliability of a judgmental technique for measuring speech breakdown, and to compare judgmental and rate measures as methods of detecting the influence of delayed side tone on the speech of a reader.

One hundred readers were recorded in two successive readings of a short prose passage. For half of the subjects one of the readings was under the condition of delayed speech side tone. For the control group of 50 subjects no electro-mechanical delay was presented. Of the 50 subjected to the experimental condition there were 10 readings at each decade side tone level from 10 to 50 db.

Two types of data were gathered from these pairs of readings: (1) time measurements of the reading rate reduction caused by the experimental condition, and (2) judgments of side tone effects by a panel of 'semi-experts.' The following were among the results obtained:

a. Increases in reading time were positively and significantly associated with the level of the side tone. The lowest level investigated (10 db) produced a statistically significant reading delay.

b. Increases in validity of judgment also appeared to be positively associated with side tone level. A majority of readers were correctly identified by the judges at a level 20 db above threshold. Judgment was 100 per cent accurate at 40 and 50 db.

c. There was a tendency for the judges to infer side tone disturbance of speech in cases where no delay was introduced. This was thought to be a function of the experience of the judges and the experimental method.

In conclusion, it appeared evident from the data that by employing a combination of rate measures and observations of other effects of speech breakdown reliable and useful clinical information could be obtained as an aid in the evaluation of suspected cases of malingering or psychogenic deafness. The side tone, or 'feedback' test, has been successfully employed in the speech clinic as a means of detecting the presence of psychogenic deafness and/or malingering.

References

1. Black, J. W. The effect of delayed side tone upon vocal rate and intensity. *JSHD*, 16, 1951, 56-60.
2. Flanagan, J. L. Effect of delay distortion upon the intelligibility and quality of speech. *J. acoust. Soc. Amer.*, 23, 1951, 303-307.
3. Lee, B. S. Artificial stutter. *JSHD*, 16, 1951, 53-55.
4. ———. Effects of delayed speech feedback. *J. acoust. Soc. Amer.*, 22, 1950, 824-826.
5. ———. Some effects of side tone delay. *J. acoust. Soc. Amer.*, 22, 1950, 639-640.
6. Neely, K. K. The effect of oral practice in the presence of different conditions of side tone upon the rate and the sound pressure level of the speech of a group of stutterers. Ph.D. dissertation, The Ohio State University, 1951.
7. Tiffany, W. R. and C. N. Hanley. Delayed speech feedback as a test for auditory malingering. *Science*, 115, 1952, 59-60.

Aspiration Levels Of Deaf Children As Compared With Those of Hearing Children

Louis Rutledge

SEVERAL investigators (*6*) have demonstrated that social factors are important determinants of the type of response elicited in the level of aspiration situation. The deaf child is considered socially immature (*1*, *2*), for his handicap severely restricts his use of language—the chief instrument of social adjustment. Pintner (*9*) states that the deaf probably have a more difficult time in their personality adjustments, and are less mature in social judgment and maturity. In accepting this concept, the present writer was attempting to determine whether or not level of aspiration behavior and its allied measures are affected by the physical handicap of deafness. The main hypothesis was that deaf children generally set their aspiration levels below those of hearing children.

It has also been shown by previous investigators that characteristic past experiences of success or failure are important determinants of aspiration behavior. Sears (*11*) demonstrated this influence of previous success and failure in utilizing a series of set tasks, as did Gruen (*4*), who compared the aspiration levels of adjusted and maladjusted adolescents. Deaf children are not as successful in obtaining good performance on motor balance tests as are normal hearing children (*7*, *8*). Thus, the second hypothesis was that deaf children will set their aspiration levels lower than hearing children in a task in which they are handicapped (i.e., The Heath Rail-Walking Test).

Previous research workers (*6*) have studied the problem of whether or not consistency exists in goal setting from one situation to another. Although unequivocal evidence for either position is not present, some research (*6*) has indicated significant reliability of aspiration level behavior between functionally unrelated tasks. Therefore, the third hypothesis was that there is a characteristic or stable 'level of aspiration' for the child.

Method

Sampling. The deaf group consisted of 52 children, 26 boys and 26 girls, with a CA of 14 or 15, who attend the Minnesota School for the Deaf at Faribault, Minnesota. Within each sex group, half of the children were classified as having hearing defects of exogenous etiology, and half as of endogenous etiology. The control group consisted of 52 normal hearing children from the Mooseheart City of Childhood at Mooseheart, Illinois. These children were matched with

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the deaf children according to the following variables: age, sex, paternal occupation, and institutionalization. Perfect matching was achieved for the variables of sex and institutionalization, and a workable matching for paternal occupation and age.

Apparatus and Procedure. The study utilized two simple motor tasks. One was the Heath Rail-Walking Test (*5*), which is a measure of locomotor coordination or balance. The apparatus, as modified for this study, consisted of three stained and varnished boards, upon which the subject walked. The largest measured 2″×4″×9′, the next 2″×2″×9′, and the smallest 2″×1″×6′. All three rails were elevated from the floor by 3″×8″×8″ blocks. Each block was routed by a groove one inch deep, just wide enough to fit its appropriate rail snugly. Each rail was marked by a white stripe every foot to facilitate scoring. Because of the differences in degree of difficulty for the three rails, the scores were weighted arbitrarily in a 1-2-4 ratio. A total score of 51 was possible. When the subject entered the testing room, he was told to remove his shoes. Then the instructions were given to him verbally if he could hear, or by means of a card system developed for the study, if he were deaf. The investigator performed the task to demonstrate what was wanted and to insure that the instructions were understood.

The second task was the Rotter Aspiration Board (*10*). As used in this study, the aspiration board was of birch, 2″×4″×38″, with a ½″× 1 1/16″ groove cut longitudinally on the top surface. A 1″ steel bearing was hit along the groove from one end by the subject with a ½″ × 14″ dowel, which resembled a miniature billiard cue. Regularly spaced depressions (every ¾″) preceded the numbered units and continued to the other end of the board, which contained the scoring scale. These depressions provided a resting place for the ball when its momentum had been spent. They also helped slow the speed of the ball. The scoring scale had a number 10 in the center. On either side, the units receded in value to number 1. A total score of 50 was possible. The Rotter Aspiration Board was administered as the second task to both the deaf and hearing groups. Appropriate instructions were given in the same manner as for the rail-walking task.

Variables. The concept level of aspiration, as used herein, is taken from Frank (*6*):

> The level of aspiration is the level of future performance in the familiar task which an individual, knowing his level of past performance in that task, explicitly undertakes to reach.

Four main points are distinguished in a typical sequence of events in a level of aspiration situation (*6*): past performance, level of aspiration setting for the next performance, new performance, and the psychological reaction to the new performance. From this sequence of events two measures were chosen to test the present hypotheses: (a) The 'aspiration score' for each child was the average of his 10 level of aspiration settings for each task. (b) The 'goal discrepancy score' was the mean of the differences between each child's aspiration level settings and his past performance score on the preceding trial. This measure was said to be positive if the level of aspiration lay above that of the past performance; otherwise, it was called a negative goal discrepancy.

TABLE 1. Means and standard deviations of the aspiration scores for the two motor tasks.

Group	*N*	*Deaf*	*Hearing*	*t*	P_t*	*F*	P_F*
A. The Heath Rail-Walking Test							
Girls	26	31.8 ± 8.7	40.5 ± 7.3	3.8	(=).01	1.4	>.05
Boys	26	37.4 ± 8.8	43.9 ± 5.3	3.2	(=).01	2.8	<.05
B. The Rotter Aspiration Board							
Girls	26	27.5 ± 6.3	30.0 ± 7.4	1.3	(=).20	1.4	>.05
Boys	26	29.8 ± 4.5	30.4 ± 6.1	0.4	>.55	1.8	>.05

*For this study a probability level of .05 is accepted as a level of significance.

Results

The *aspiration score* for each child was the average of his 10 level of aspiration settings for each task. Since past performance seems to affect the level of aspiration setting (*6*), it is to be expected that the nature of the aspiration scores will depend, in part, upon performance levels. Table 1 shows the means and standard deviations of the aspiration scores for the two motor tasks. On the Heath Rail-Walking Test it appears that the deaf boys and girls set their aspiration levels significantly lower than do their hearing contemporaries. The deaf boys are significantly more variable, moreover, than hearing boys in their level of aspiration scores on this task. There is not a significant difference, however, in the comparison of the dispersions of the deaf and hearing girls' scores.

No significant differences appear in the data comparisons for any of the groups on the Rotter Aspiration Board.

These findings do not support the hypothesis that deaf children generally set their aspiration levels below those of hearing children. The hypothesis that deaf children will set their aspiration levels lower than hearing children in a task in which they are handicapped, however, is tenable. Both the deaf girls and the deaf boys set their aspiration levels significantly lower on the Heath Rail-Walking Test than did their hearing controls. But in a task in which the deaf were not thought to be handicapped (the Rotter Aspiration Board), no significant differences appeared between the two groups.

The *goal-discrepancy score* was the mean of the differences between each child's aspiration level settings and his performance score on the preceding trial. Table 2 shows the means and standard deviations of the goal-discrepancy scores for the two motor tasks. On the Heath Rail-Walking Test the deaf boys and girls set their levels of aspiration significantly below their past performances as compared with the hearing children. Although there are no significant differences in the variation of the goal discrepancy for the two groups, striking differences exist with regard to the linear position of the dispersions. The range of variation of the deaf group is shifted toward the lower end of the scale. The deaf children have a greater

TABLE 2. Means and standard deviations of the goal-discrepancy scores for the two motor tasks.

Group	*N*	*Deaf*	*Hearing*	*t*	P_t	*F*	P_F
A. The Heath Rail-Walking Test							
Girls	26	0.4 ± 4.8	4.8 ± 4.8	3.2	<.01	1.0	>.05
Boys	26	0.2 ± 5.8	4.2 ± 4.3	2.8	<.01	1.8	>.05
B. The Rotter Aspiration Board							
Girls	26	0.6 ± 6.1	5.3 ± 6.2	2.7	(=).01	1.0	>.05
Boys	26	3.5 ± 4.3	5.2 ± 6.2	1.2	(=).20	2.1	>.05

number of negative goal-discrepancy scores (24, 12 boys and 12 girls) than do the hearing children (4, 1 boy and 3 girls). A chi-square test of this difference in scores is significant at the .001 level.

On the Rotter Aspiration Board, the data indicate that the deaf girls set their levels of aspiration significantly lower than their past performances as compared with the hearing girls. No significant difference exists between the deaf and hearing boys. There are no significant differences in the amount of variation for either of the groups on goal-discrepancy scores. But the deaf children do have a greater number of negative goal-discrepancy scores (14, 5 boys and 9 girls) than do the hearing children (7, 3 boys and 4 girls). A chi-square test of this difference in scores is significant at the .05 level.

Thus, for the goal-discrepancy score comparison involving the deaf and hearing boys, hypothesis two appears to be tenable whereas hypothesis one does not. For the deaf and hearing girls' comparison, however, both hypotheses seem to be tenable, i.e., the deaf girls set their aspirations levels significantly below their past performances in both motor tasks. The reason for this sex difference is not clear. Therefore, unless further evidence of this nature is forthcoming, it seems safe at present to conclude that deaf children set their aspiration levels below those of their past performances only in tasks in which they are handicapped. Trends that aspiration behavior can generalize to other situations in which the deaf are not handicapped appear, but are not significant at accepted probability levels.

By correlating subjects' aspiration scores in the two motor tasks, it is possible to state whether there is a characteristic or stable *level of aspiration*. Table 3 indicates that this rela-

TABLE 3. Correlation between the two motor tasks with respect to the aspiration score.

Group	*N*	*Deaf*	*P*	*Hearing*	*P*
Girls	26	.66	(=).001	.55	<.01
Boys	26	.36	(=).07	.45	(=).02

tionship is significantly greater than zero (criterion $P=.05$) for all groups except the deaf boys ($P=.07$). Even though performance is independent in the two tasks (probability levels exceed .05 for all groups), the child's tendency to set a high or low goal appears not to be independent. If this finding were to appear on a variety of motor tasks (of which this study has sampled two rather dissimilar ones), it might be possible to state that goal-setting is somewhat characteristic of the child, rather than being entirely peculiar to the task itself.

Discussion

It is clear that this study is an isolated sampling attempt to determine whether deaf children differ in their goal-setting behavior from hearing children. The findings should be interpreted with regard to this limitation. Furthermore, both groups consisted of institutionalized children, the deaf children coming from a public residential school. Therefore, it is possible that future studies utilizing either matched institutionalized groups or day-school groups may differ from the results of this study.

Nevertheless, there are many similarities existing between this study's results and those of other investigators. As Sears (*11*) and Gruen (*4*) have indicated, significant differences in aspiration settings occur between groups who are successful in a given task or adjustment and those who are not. This study also adds further support to evidence (*6*) which indicates that goal-setting may be somewhat of a stable personality characteristic. Possibly because of the crudeness of present day methods, however, or even because of the nature of the personality phenomena themselves, these obtained results, present study included, do not yield indications of consistently reliable behavior (e.g., present study correlation coefficients range from .36 to .66).

Since goal-setting is an important determinant of vocational success, results such as those of the present study may eventually aid counselors in helping deaf adolescents to select appropriate fields of endeavor. One's vocational aspirations should always be tempered by a realistic recognition of his limitations. Surely the deaf, if they are to be effective, must realize the limitations their handicap imposes upon them.

The present investigator was impressed by the overt behavioral differences existing between the two groups. The deaf, as a group, seemed more unsure of themselves than did the hearing children. Apparently their lack of confidence expressed itself in their level of aspiration behavior. Moreover, other manifestations of emotional instability were shown by the deaf groups. The level of aspiration situation, as utilized in this study, is limited to only one aspect of personality organization. Therefore, a more widespread clinical and experimental investigation may yield increased understanding of the predominate personality characteristics related to deafness.

Summary

Deprived of the normal use of language in social communication, the deaf child necessarily is hampered in effecting social maturity. Since social factors are important determinants of goal-setting behavior, the objectives of this study were to determine: (a) whether or not deaf children differ consistently from hearing children in

their level of aspiration behavior; (b) whether or not goal-setting differences exist only on tasks in which the deaf children are handicapped; (c) whether or not there is a characteristic level of aspiration for the child. Fifty-two institutionalized deaf children and 52 institutionalized hearing children completed a series of 10 goal-settings on two motor tasks (a balance test and an aspiration board). The results of the two measures utilized, i.e., aspiration score and goal-discrepancy score, indicate significant and consistent differences between the two groups only on the task in which the deaf are handicapped. Trends that aspiration behavior can generalize to another situation (aspiration board) in which the deaf are not handicapped appear but are not significant at accepted probability levels. There were indications, also, that aspiration levels may be somewhat characteristic of the child despite the nature of the task; however, this study did not yield evidence of consistently reliable aspiration behavior.

References

1. Bradway, K. P. The social competence of deaf children. *Amer. Ann. Deaf*, 82, 1937, 122-140.
2. Burchard, E. M. L. and H. R. Myklebust. A comparison of congenital and adventitious deafness with respect to its effect on intelligence, personality, and social maturity. Part II. Social maturity. *Amer. Ann. Deaf*, 87, 1942, 241-255.
3. Gregory, I. A comparison of certain personality traits and interests in deaf and hearing children. *Child Develpm.*, 9, 1938, 277-280.
4. Gruen, E. W. Level of aspiration in relation to personality factors in adolescents. *Child Develpm.*, 16, 1945, 181-188.
5. Heath, S. R., Jr. Rail-walking performance as related to mental age and etiological type among the mentally retarded. *Amer. J. Psychol.*, 55, 1942, 240-247.
6. Lewin, K., T. Dembo, L. Festinger and P. Sears. Level of aspiration. In J. Mc V. Hunt, ed. *Personality and the Behavior Disorders*. New York: Ronald Press, 1944.
7. Long, J. A. *Motor Abilities of Deaf Children*. Teachers Coll. Contrib. to Educ., No. 514. New York: Columbia Univ., 1932.
8. Morsh, J. E. Motor performance of the deaf. *Comp. Psychol. Monogr.*, 13, 1936.
9. Pintner, R. The deaf. In Pintner, R., J. Eisenson and M. Stanton. *The Psychology of the Physically Handicapped*. New York: F. S. Crofts, 1946.
10. Rotter, J. B. Level of aspiration as a method of studying personality. II. Development and evaluation of a controlled method. *J. exp. Psychol.*, 31, 1942, 410-422.
11. Sears, P. S. Levels of aspiration in academically successful and unsuccessful children. *J. abnorm. soc. Psychol.*, 35, 1940, 498-536.

Letter To The Editor

Sir:

I wish to commend Mr. Theodore Mandell of the Detroit Public Schools for his letter to you in the September, 1953 issue. He supplied additional data on the history of speech correction in Detroit which adds greatly to what appeared in the dissertation he mentioned. Local materials are not always known or available to a research person and we must depend upon local individuals to furnish our historians with significant details.

It is to be hoped that many persons, familiar with the history of our field, will add what color and factual material they can to the information that has already been assembled. It is by the contributions of those who *know* that we will be able to preserve the true flavor of our early days.

Dorothy Kester
Akron Public Schools

Book Reviews

BURT, CYRIL. *The Causes and Treatment of Backwardness.* New York: Philosophical Library, 1953. Pp. 128. $3.75.

The author is a school psychologist in England, and the present volume is to some extent an abridgement of a larger volume published 15 year ago entitled *The Backward Child.*

The material includes a brief history of child study, an outline of the various factors which are found in the slow-learner, and a chapter devoted to practical conclusions.

NACHMANSOHN, DAVID, ed. *Nerve Impulse.* (Transactions of the Fourth Conference). New York: Josiah Macy, Jr. Foundation, 1954. Pp. 224. $4.00.

This volume is an edited transcription of a three-day discussion on *Nerve Impulse* by 22 leading authorities. The basis of the discussion was provided with the presentation of three papers: *Mechanism of Vision,* by George Wald; *Mechanism of Hearing,* by Hallowell Davis; and *Sensory Receptors,* by Yngve Zotterman.

As is customary in the Josiah Macy, Jr. Foundation Conferences, the discussants represented many different disciplines including zoology, biophysics, neurology, physiology, and several branches of medical research.

REMMERS, H. H. *Introduction to Opinion and Attitude Measurement.* New York: Harper and Brothers, 1954. Pp. 437. $5.00.

This book, under the editorship of Gardner Murphy, is divided into two parts: *Techniques in Opinion and Attitude Measurement* and *Applications of Opinion and Attitude Measurement.*

In Part I, consisting of 251 pages, the author presents a preliminary overview on *Attitudes,* and discussions on sampling, statistics, scaling techniques, the single question, the summated questionnaire, and less direct measures of attitudes.

In Part II the various applications of opinion and attitude measurement are discussed. These include applications to business, government, industry, community interrelations, and education.

References are cited at the end of each of the 12 chapters.

LLOYD, FRANCES. *Educating the Sub-Normal Child: Aspects of a Junior School for Educationally Sub-Normal Children.* New York: Philosophical Library, 1953. Pp. 148. $3.75.

The author is head of a school for educationally sub-normal children in England. She discusses the educability of mentally handicapped children, the aims of the special school and how it can best achieve them, the social training of 'E.S.N.' children with special reference to their own cultural background and their parents' attitudes, and how the mentally handicapped child who also appears emotionally disturbed can be helped through creative work to achieve adjustment.

Some of her examples are drawn from the older 'E.S.N.' girls (11-16) with whom she worked for six years, but the emphasis throughout the book is on the work of her Junior school.

Nine pages are devoted to *Language and Reading.*

LAIRD, CHARLTON. *The Miracle of Language.* Cleveland: The World Publishing Co., 1953. Pp. 308. $4.00.

The author, professor of English and linguistic scholar at the University of Nevada, explains in terms understandable to laymen the development of the English language and grammar down to the present day.

The style is imaginative as indicated by such chapter headings as *Whodunit? Skeletons in the Linguistic Closet; Both a Borrower and a Lender Be; Linguistic Ellis Island; Another Leaky Grammar;* and *The Way of a Man with a Noise.*

Book Reviews is edited by Kenneth Scott Wood, University of Oregon.

CHASE, STUART. *Power of Words.* New York: Harcourt, Brace and Co., 1954. Pp. 308. $3.95.

The present volume grew out of the author's earlier work, *The Tyranny of Words,* published in 1938. The scope of this new book has expanded from semantics and the problems of meaning to the whole broad field of communication. Written in popular style, the material touches on cybernetics, linguistics, brain physiology, group dynamics, communication among animals and language development in children.

The author relates some of the new findings in communication to mass media, campaign oratory, Russian propaganda, economic talk, medical talk, and varieties of 'gobbledygook.'

Prematurity, Congenital Malformation, and Birth Injury. (Proceedings of a Conference sponsored by the Assoc. for the Aid of Crippled Children). New York: Assoc. for the Aid of Crippled Children, 345 E. 46 Street, 1953. Pp. 255. $4.00.

This book discusses the nature of premature births, their incidence, and various factors which have to be dealt with in saving them. There is discussion on *infection, fetal hemoglobin, vitamins, respiratory enzymes* and *anaerobic metabolism,* endocrinology, and prevention of prematurity.

The problems of congenital malformation and birth injury are discussed with attention given to the variety of possible causes.

NICHTENHAUSER, ADOLF, MARIE L. COLEMAN AND DAVID S. RUHE. *Films in Psychiatry, Psychology, and Mental Health.* (Medico Audio-Visual Instit. of Assoc. of Amer. Med. Coll.) New York: Health Education Council, 1953. Pp. 269. $6.00.

The core of this book is a series of critical reviews of 41 films in psychiatry, psychology, and mental health supplemented by brief descriptions of 50 additional films. Each review gives production data, a description of the intended audience, content description as well as an extended appraisal of the content, presentation, and effectiveness of each film.

Some of the films reviewed are: *The Angry Boy; Unconscious Motivation; The Unity of Personality; Fears of Children; Shades of Gray; Activity Group Therapy;* and *Problem Children.*

The material upon which the appraisals are based represents the opinions of several panels of specialists who viewed each film.

PODOLSKY, EDWARD, ED. *Music Therapy.* New York: Philosophical Library, 1954. Pp. 335. $6.00.

In this volume 39 writers have contributed 32 articles on the practical applications of music therapy to mental, emotional, and physical ailments. Some of the articles have been published previously in professional journals.

The following are examples of the types of articles included: *Control of Athetoid Tremors by Sound Control; Music Therapy in Anxiety States; Music Therapy in Depression;* and *Limitations of Research in Music Therapy.*

ABRAMSON, HAROLD A., ed. *Problems of Consciousness.* (Transactions of the Fourth Conference). New York: Josiah Macy, Jr. Foundation, 1954. Pp. 177. $3.25.

This is an edited transcript of one of the multiprofessional conferences sponsored by the Josiah Macy, Jr. Foundation. Topics taken up in this conference include *The Problem of Consciousness in Child Psychology: Developmental Changes in Awareness; Consciousness and the Symbolic Processes;* and *A Review, an Analysis, and a Proposition.*

Principals in the discussion were Jean Piaget, Talcott Parsons, and Roy R. Grinker. Twenty-two persons participated in the discussions during a three-day period.

BARR, ARVIL S., ROBERT A. DAVIS AND PALMER O. JOHNSON. *Educational Research and Appraisal.* New York: J. B. Lippincott Co., 1953. Pp. 362. $6.00.

This book was designed for field workers. Its principal concern is with field research and appraisal as distinguished from artificially designed laboratory studies. It stresses research that may be conducted in school settings as a basis for action. Teaching experience and undergraduate mastery of concepts in measurement, statistics, and social foundations are assumed.

A section on *Writing a Thesis* is given in the appendix.

STOLUROW, LAWRENCE M., ED. *Readings in Learning.* New York: Prentice-Hall, Inc., 1953. Pp. 555. $4.50.

This is a collection of original articles and summaries of articles written by psychologists who have made contributions to the psychology of learning. For the most part articles appear as originally published, although some are abridged. Some of the authors whose articles are included are Thorndike, Hull, Tolman, Pavlov, Mowrer, Wolfle, Woodworth, Spence, and Skinner.

WHITFIELD, I. C. *An Introduction to Electronics for Physiological Workers.* New York: St. Martin's Press, 1953. Pp. 236. $3.50.

This book gives an account of basic electronic theory with emphasis placed on what is relevant to a biologist's point of view. The material is designed for those using electro-physiological techniques in botanical, zoological, and medical laboratories.

The Pre-adolescent Exceptional Child. (Proceedings of the 35th Conference of the Child Research Clinic of the Woods Schools) Langhorne, Pa.: The Woods Schools, 1953. Pp. 66. Gratis.

Papers included are: *Diagnosis of Various Syndromes of the Retarded Child; Treatment of the Mentally Retarded Child;* and *What's Ahead for the Retarded Child and His Parents.*

Register of Research in the Social Sciences. (No. 10, 1952-1953). New York: Cambridge University Press, 1953. Pp. 213. $4.50.

This register provides a guide to research in progress in the universities, research institutions, and other agencies in the British Isles. The first four in the series were circulated privately. Publication for sale began with No. 5 in 1948.

Information was collected by means of detailed questionnaires concerning all research in the social sciences excluding private research. The interpretation of the scope of social science is broad. Approximately 700 Ph.D. thesis titles are given. A directory of research institutions is also given.

Current Publications

ABRAMSON, HAROLD A., ed. *Problems of Consciousness.* (Transactions of the Fourth Conference.) New York: Josiah Macy, Jr. Foundation, 1954. Pp. 177. $3.25.

ANASTASI, ANNE. *Psychological Testing.* New York: Macmillan Co., 1954. Pp. 695. $6.75.

BOIES, LAWRENCE R. *Fundamentals of Otolaryngology.* (2nd ed.) Philadelphia: W. B. Saunders Co., 1954. Pp. 487. $7.00.

BROWN, FRANCIS J. *Educational Sociology.* (2nd ed.) New York: Prentice-Hall, Inc., 1954. Pp. 694. $6.65.

COLE, LUELLA W. AND MRS. ROBERT H. LOWIE. *Psychology of Adolescence.* (4th ed.) New York: Rinehart and Co., 1954. Pp. 728. $6.00.

Current Trends in Information Theory. Pittsburgh: University of Pittsburgh Press, 1954. Pp. 201. $4.00.

DELAFRESNAYE, J. F. AND T. E. OPPE. *Anoxia of the New-Born Infant.* Springfield, Ill.: Charles C. Thomas, 1954. Pp. 248. $5.50.

EHRENZWEIG, ANTON. *Psychoanalysis of Artistic Vision and Hearing.* New York: Julian Press, 1953. Pp. 272. $5.00.

ENTWISTLE, WILLIAM J. *Aspects of Language.* New York: Macmillan Co., 1954. Pp. 379. $8.00.

EWING, IRENE R. AND A. W. G. EWING. *Speech and the Deaf Child.* Washington, D. C.: The Volta Bureau, 1954. Pp. 256.

HAY, JULIE AND CHARLES WINGO. *Reading with Phonics.* Philadelphia: J. B. Lippincott Co., 1954. Pp. 128. $2.40.

JENKINS, RICHARD L. *Breaking Patterns of Defeat: The Effective Readjustment of the Sick Personality.* Philadelphia: J. B. Lippincott Co., 1954. Pp. 270. $6.75.

JERSILD, ARTHUR T. *Child Psychology.* (4th ed.) New York: Prentice-Hall, Inc., 1954. Pp. 688. $8.00.

KEESING, F. M. *Review of Research in Social Anthropology.* New York: Oxford Book Co., 1953. Pp. 119. $4.50.

LEONARD, EDITH M. AND OTHERS. *Counseling with Parents in Early Childhood Education.* New York: Macmillan Co., 1954. Pp. 337. $3.75.

LLOYD, FRANCES. *Educating the Sub-normal Child.* New York: Philosophical Library, 1953. Pp. 148. $3.75.

MARTIN, WILLIAM E. AND CELIA B. STENDLER. *Readings in Child Development.* New York: Harcourt, Brace, and Co., 1954. Pp. 534. $5.00.

MYKLEBUST, HELMER R. *Auditory Disorders in Children.* New York: Grune and Stratton, 1954. Pp. 367. $6.00.

McGILL, V. J. *Emotions and Reasons.* Springfield, Ill.: Charles C. Thomas, 1954. Pp. 137. $3.25.

McNEIL, C. KERR. *Oral and Facial Deformity.* New York: Pitman Publishing Corp., 1954. Pp. 134. $5.00.

PEPINSKY, HAROLD B. AND PAULINE N. PEPINSKY. *Counseling: Theory and Practice.* New York: Ronald Press, 1954, Pp. 315. $4.50.

REMMERS, HERMANN H. AND OTHERS. *Introduction to Educational Psychology.* New York: Harper and Brothers, 1954. Pp. 444. $4.00.

ROBINSON, HELEN M., ed. *Corrective Reading in Classroom and Clinic.* (Supplementary Educational Monograph, No. 79) Chicago: University of Chicago Press, 1953. Pp. 256. $3.50.

SORENSON, HERBERT. *Psychology in Education* (3rd ed.) New York: McGraw-Hill Book Co., 1954. Pp. 587. $5.50.

TUCKER, CHARLOTTE D. *Betty Lee: Care of Handicapped Children.* New York: Macmillan Co., 1954. Pp. 178. $3.00.

VAN RIPER, CHARLES. *Speech Correction: Principles and Methods.* (3rd ed.) New York: Prentice-Hall, Inc., 1954. Pp. 582.

VAN RIPER, CHARLES G. AND DOROTHY E. SMITH. *An Introduction to General American Phonetics.* New York: Harper and Brothers, 1954. Pp. 152. $2.50.

WILLIAMS, CECIL. *The Foundations of Intelligence.* New York: Comet Press Books, 1953. Pp. 126. $2.50.

YARWOOD, THOMAS M. *Acoustics: A Textbook for Physics and Engineering Students.* New York: St. Martin's Press, 1954. Pp. 356. $3.50.

Abstracts

BENSON, R. W. AND I. J. HIRSH. Some variables in audio spectrometry, *J. acoust. Soc. Amer.*, 25, 1953, 499-505.

The long-time average spectrum of speech was measured with particular attention to the following variables: (1) type of speech material, (2) size of bands used in analysis, (3) length of speech sample, and (4) individual talkers. Long-time average spectra for technical material, news, and 'Joe . . . lawn' test sentence were found among 30, 60, and 90 second sampling time for octave, half-octave, and equal-mel intervals. Interpersonal variability is small and seemed a function of 'over-all level.' (*F.M.L.*)

WINCKEL, F. Physikalische Kriterien für objective Stimmbeurteilung. *Folia phoniatr., Basel*, 5, 1953, 232-252.

'From a statistic evaluation out of a great number of sound-spectrograms taken of eminent singers the lecturer has established an "optimum" spectrogram demonstrating the typical marks of properties of the voice . . . Thus a basis is established for the objective qualification of the voice.' (*A.J.B.*)

DREYFUS-GRAF, J. Phonetographe et phonetique. *Folia phoniatr., Basel*, 5, 1953, 223-232.

'The steno-sonograph will serve . . . for scientific studies . . . The phonetograph will offer new practical horizons . . . [They] will allow the speaker to control, at any moment, the correction of his speech . . . , or the deaf to follow a conversation. These spectra, on the other hand, provide objective measurements of the phonetic elements: they will serve both phoneticians and phoniatrists in discovering the invariables of speech, as well as the normal or pathological deviations . . . ' (*A.J.B.*)

DOCTOR, P. V. The teaching of speech to the deaf. *Quart. J. Speech*, 39, 1953, 488-490.

A survey of current facilities and an overall look at the changes in the education of the deaf during the last 50 years. (*C.F.D.*)

Educational problems of the deaf: I. The training of teachers of the deaf—yesterday, today and tomorrow. H. M. Quigley; II. The educational program in existence in schools for the deaf. L. M. Elstad; III. Educational problems of the deaf. E. Kennedy; IV. The deaf child. R. M. Stelle; V. Some of the problems encountered in teaching speech to deaf children. C. V. Hudgins; VI. Psychological and emotional problems of deaf children. E. Meyer. *Amer. Ann. Deaf*, 98, 1953, 431-477.

Reprints of papers presented at the Thirty-first Annual Convention of the International Council for Exceptional Children, April, 1953. (*A.J.B.*)

GOLDNER, I. Deafness in shipyard workers. *Arch. Otolaryng., Chicago*, 57, 1953, 287-309.

Hearing losses in 403 shipyard workers were arranged to show typical clinical audiogram: A high hearing loss was not directly correlated with length of employment. Older workers and those working in confined spaces showed greater losses. Workers with perforated eardrums were more susceptible to acoustic trauma. A preventive program is described. (*F.M.L.*)

HERZON, D. M. New pneumophone. *Arch. Otolaryng., Chicago*, 57, 1953, 437-441.

A simple, economical pneumophone for rapid quantitative determination of eusta-

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Abstracts is edited by Jack Matthews, University of Pittsburgh, assisted by the following committee: Asa J. Berlin, Pennsylvania State University; Virginia B. Carroll, Minneapolis Veterans Hospital; Charles F. Diehl, University of Kentucky; James V. Frick, Pennsylvania State University; Inez E. Hegarty, Mt. Holyoke College; Lester L. Hale, University of Florida; Frank M. Lassman, University of Minnesota; Georgiana M. Peacher, Temple University; Sylvia O. Richardson, San Diego, Calif.; George H. Shames, University of Pittsburgh; D. C. Spriestersbach, State University of Iowa; Jesse J. Villarreal, University of Texas. The committee systematically reviews 203 journals for articles of interest to members of ASHA.

chian tube function is described with indications for its use. (*F.M.L.*)

JERGER, J. F. D_1 difference test. *Arch. Otolaryng., Chicago,* 57, 1953, 490-500.

A test of recruitment is described which relates the magnitudes of the D_1's at 10 and 40 db. Comparisons with Luscher and Denes-Naunton techniques are made. (*F.M.L.*)

PAULS, M. D. AND W. G. HARDY. Hearing impairment in pre-school age children. *Laryngoscope,* 63, 1953, 534-544.

Of 572 infant and preschool age children studied, 1/5 were found to have normal hearing by PGSR. Seventeen per cent had 40 to 60 db losses. Thirty-two per cent had 60 to 75 db impairments. Twenty-seven per cent had losses of 75 db or greater. No child had a total deafness. Ten basic audiologic concepts are offered. (*F.M.L.*)

SCHUKNECHT, H. F. AND S. SUTTON. Hearing losses after experimental lesions in basal coil of cochlea. *Arch. Otolaryng., Chicago,* 57, 1953, 129-142.

Lesions were made in the basal coil of the cochlea in six cats by directing a small needle through the round window. Conditioned audiograms for all animals showed abrupt high frequency hearing losses. With increasing intensity, the spread of the excitatory process was less for high frequencies than for lows. Pathological findings are discussed. (*F.M.L.*)

Symposium on aircraft noise. *J. acoust. Soc. Amer.,* 25, 1953, 363-442.

Fourteen papers are presented on the generation, propogation, and control of aircraft noise. These were read at San Diego meeting of Acoustical Society in November 1952. (*F.M.L.*)

WALDROP, W. F. Puppet show hearing test. *Volta Rev.,* 55, 1953, 488.

Description of motivational and conditioning device to facilitate pure tone audiometry with preschool age children. (*A.J.B.*)

WORKMEN'S COMPENSATION BOARD OF THE STATE OF NEW YORK. Occupational loss of hearing; a report of the Committee of Consultants. *Industr. Med. Surg.,* 1954, 23, 128-132.

Report on hearing loss hazards of industrial noise and the determining of degree of loss in compensation cases. (*J.M.*)

BUTLER, S. Similarities in services for the deaf and hard of hearing. *Hearing News,* 22, 1954, 12.

Author compares rehabilitation services and procedures for deaf and hard of hearing. (*J.M.*)

SCHUKNECHT, H. F. AND R. C. WOELLNER. Hearing losses following partial section of the cochlear nerve. *Laryngoscope,* 63, 1953, 441-465.

The cochlear nerve was partially cut in five cats. Partial degeneration of the spiral ganglion resulted in four cats without concurrent changes in the organ of Corti. The microphonic response to steady sinusoidal stimuli and to clicks remained normal. By selective section, restricted hearing losses were produced for both low tones and for high tones. Threshold for any frequency remained normal when 20 to 40 per cent of spiral ganglion cells remained in the region of the cochlea serving the frequency. Threshold was elevated when less than 20 per cent of ganglion cells remained. (*F.M.L.*)

WASHINGTON, M. L. Differences in services for the deaf and hard of hearing. *Hearing News,* 22, 1954, 7-8, 16, 18, 22.

Author contrasts rehabilitation services and procedures for deaf and hard of hearing (*J.M.*)

SAAIJENGA, H. Do's and don'ts for speech correctionists. *J. except. Child.,* 20, 1954, 322-324.

A list of 26 suggestions to aid the speech correctionist in relations with parents, pupils, school personnel and public. (*J.M.*)

Amer. Psychologist, 8, 1953, entire issue.

The October, 1953, issue centers around legislation for psychologists. Of special interest is an article on legislative implications in the Report of the *Ad Hoc* Committee on Relations between Psychology and Other Professions. This report dealt with such matters as licensing or certification of psychologists, independent private practice, and the minimal qualifications of psychologists for private practice. (*J.V.F.*)

Day classes for severely retarded children. A report of the Education Committee of the National Association for Retarded Children. *Amer. J. ment. Def.,* 58, 1954, 357-370.

A questionnaire survey of day classes for severely retarded children, distributed and

analyzed by Samuel A. Kirk and Marvin Wirtz, provides information on the major objectives of extant programs. Among the major objectives reported, the area of 'intellectual development,' consisting mostly of oral speech activity, constituted about 30% of the total program. (*J.J.V.*)

SCHLANGER, B. B. Speech therapy results with mentally retarded children in special classes. *Train. Sch. Bull.*, 50, 1953, 179-186.

A report of the results of therapy with 62 speech defective children with an I.Q. range of 39 to 77. Slow learning children can make significant gains in speech and language. There was no relationship between articulation improvement and sound discrimination ability or mean sentence length. The author gives items conducive to good motivation, reasons for early intensive therapy and differential diagnosis. (*A.J.B.*)

WHITNEY, E. A. Mental deficiency, 1952. *Amer. J. ment. Def.*, 58, 1953, 1-12.

Annual review of significant research in the area of mental deficiency in 1952. A bibliography of 23 items, a number of which relate to speech defects and speech therapy. (*J.J.V.*)

KLEBANOFF, S. G. Psychological consequences of brain lesions and ablations. *Psychol. Bul.*, 51, 1954, 1-41.

Reviews literature on therapeutic psychosurgery and discusses trends in development of evaluative techniques with potential clinical value. 307-item bibliography. (*J.M.*)

PALMER, M. F. Recent advances in the scientific study of language disorders in cerebral palsy. *Cerebral Palsy Rev.*, 15, 1954, 3-6.

Author discusses communicative aspects of habilitation for cerebral palsied child. Examples are given of studies which have potential value in planning the training of the cerebral palsied. Several approaches to language development are suggested. (*J.M.*)

SCHUELL, H. Clinical observations on aphasia. *Neurology*, 4, 1954, 179-189.

A description of auditory, visual and motor impairments found in aphasic patients. '. . . Patterns of impairment which tended to recur were: (1) a pattern of severe damage, (2) a consistent pattern of aphasic disabilities found in all patients, and (3) the same pattern, complicated by superimposed visual involvement, motor involvement, or mental deterioration.' (*J.M.*)

STRAUSS, A. A. Aphasia in children. *Amer. J. phys. Med.*, 33, 1954, 93-99.

Using the term 'oligophasia' to signify language deficit or lack of language development in children, the author compares this condition to aphasia in adults where language loss takes place after full development of language. Definition, description of types, tests and treatment of oligophasia are discussed. (*J.M.*)

BOSMA, J. F. Studies of disability of the pharnyx resultant from poliomyelitis. *Ann. Otol., etc., St Louis*, 62, 1953, 529-547.

'A series of 28 patients having persistent sequelae of disability following bulbar pharyngeal poliomyelitis has been reviewed. The basic patterns of pharyngeal paralysis and disability of function have been defined . . . . The criteria of identification of these forms of paralysis are described. The mechanism of associated disability of speech and swallowing and the resultant medical problems and therapy of the patients are discussed.' (*J.M.*)

KOGAN, L. S. AND B. H. BROWN. A two-year study of case record uses. *Soc. Casewk*, 35, 1954, 252-257.

An analysis of the various uses of case records, including case study, student training, research, public relations, general education, and community planning, indicates a need for additional experimental study of methods to improve case reporting in order that permanent records may be less time-consuming and less expensive, yet more effective and more useful. (*I.E.H.*)

OATHOUT, M. C. Books and mental patients. *Library J.*, 79, 1954, 405-410.

An attempt to formulate a methodology of research in bibliotherapy. Bibliography included. (*J.M.*)

SHAFFER, E. E., Jr. The autobiography in secondary school counseling. *Personnel & Guidance J.*, 32, 1954, 395-398.

The writer summarizes the findings of his doctoral dissertation on the autobiography as a method of studying the personality of high school students as a part of a guidance program and concludes that analysis of autobiographical material provides an effective technique, which warrants more use by counselors. (*I.E.H.*)

News And Announcements

At the twelfth annual meeting of the American Association for Cleft Palate Rehabilitation in Pittsburgh, May 14 and 15, the following members of ASHA were elected to offices: Eugene T. MacDonald, President-Elect; Jack Matthews, re-elected Secretary-Treasurer; McKenzie Buck, elected to the Executive Council. Cecil R. Conroy, D.D.S., was elected President.

Sigma Alpha Eta is preparing and making available to its chapters materials designed for recruitment in speech correction personnel. A career pamphlet giving an over-view of the profession of clinical speech and hearing, and a folder giving the aims and activities of Sigma Alpha Eta and a copy of Ruth Clark's film, 'These Untrained Tongues.' A handbook for Sigma Alpha Eta members is being prepared by Margaret Burn, Editor for Sigma Alpha Eta. A booklet for ceremonies for the installation of chapters and the various levels of membership is being prepared under the direction of Clara Mawhinney, President of Sigma Alpha Eta.

The Speech Correction Clinic of Jacksonville, Florida has been amalgamated with the Child's Guidance Clinic in Jacksonville. Edward L. Flemming has been appointed Director.

Beginning in the fall of 1954 the Children's Speech Clinic of the University of Denver will have an occupational therapy room which will be in charge of a registered occupational therapist under the direction of the Junior League of Denver, Colorado. The Junior League has remodeled the room and is furnishing equipment and paying the salary of the therapist.

News and Announcements is edited by Charles R. Elliott, Northwestern University, assisted by the following committee: Jane Beasley, University of Alabama; George Gens, Newark (New Jersey) State Teacher's College; Elise Hahn, University of California at Los Angeles; Earl Schubert, State University of Iowa.

The Arkansas Association of Speech Correctionists was formed in April of this year. The organization is open to speech correctionists in the state and the following members were elected to offices: President, Mary Louise McDowell; First Vice President, Joanna Davis; Second Vice President, Donna Russell; Secretary-Treasurer, Kelmer Baxter. The group plans to meet three times during the school year.

The Speech Correction Foundation has made a grant of $500 to Mr. Louis Lerea who is completing his Ph.D. at the University of Pittsburgh. Robert Schaef, who received a $500 grant to complete his Ph.D. last year at the University of Pittsburgh, will join the staff of the Columbus Psychiatric Clinic.

A limited number of fellowships for social scientists interested in the emotional, psychological and social factors related to the rehabilitation of physically handicapped persons were announced by the National Foundation for Infantile Paralysis. These fellowships will be awarded to established professional workers or unusually promising graduate students who have completed a minimum of two years of work toward the doctorate in one of the social sciences. Application forms may be obtained from the Division of Professional Education, National Foundation for Infantile Paralysis, 120 Broadway, New York 5, N. Y.

The National Society for Crippled Children and Adults has announced that 20% of the skilled professional positions in the 874 facilities of the Easter Seal Society are vacant. There are some 200 vacancies among the 800 positions for program directors, physical therapists, occupational therapists, speech therapists, special education teachers, medical social workers and psychologists. Still other jobs are available in the administrative force. Trustees of the Society have voted to launch a research project into the cause of crippling diseases. The group has an annual

ten million dollar aid program. Previously it spent virtually all of its funds in direct aid to the crippled.

Harvard University has announced the award of a United States Public Health Service grant of $215,000 to the Judge Baker Guidance Center and Children's Hospital for a five-year study of the emotional disturbances of childhood. Particular emphasis will be placed on the role of aggression in children.

Jack Matthews was elected President and Leo Doerfler, Vice President of the Greater Pittsburgh Hearing Council, an organization made up of agencies in Western Pennsylvania offering services and doing research and training in the area of hearing handicaps.

The International Development Placement Association, Inc. of 345 E. 46th St., New York 17, is a non-profit organization whose function is to find qualified persons for foreign development programs who cannot be obtained through existing channels of international recruitment. It aims its appeal toward those who are eager to serve where trained persons are needed and who are willing to work at local salaries and under local conditions. Its services are rendered without fee.

Three new chapters have joined Sigma Alpha Eta: Alpha Kappa, University of Maryland, Merle Ansberry, Advisor; Alpha Lambda, Ohio State University, Ruth Beckey Irwin, Advisor; Alpha Mu, Marquette University, Alfred Sokolnicki, Advisor.

West Virginia University has been given $2000 by the Marion County Society for Crippled Children and Adults and the Junior League of Fairmont, W. Va. The money is to be spent for running the Community Speech Clinic at Fairmont, and extending the work into the public schools of Marion County. The grant this year is $800 more than the two organizations made available last year.

The Clinical Speech and Hearing Division of the Pennsylvania Speech Association has elected the following officers: Chairman, Charlotte Avery, Eye and Ear Hospital, Pittsburgh; M. Alice Hunter, Department of Public Instruction, Harrisburg; Representatives, Jack Matthews, William J. Horean; Program Chairman for the 1954 Convention, James V. Frick.

The Cleveland Clinic Foundation has expanded its services to include audiological and clinical speech diagnosis and treatment. Warren Gardner has resigned as professor of Hearing and Speech Pathology at Western Reserve University and as coordinator of research at the Cleveland Hearing and Speech Center to become Chief of Audiology and Speech Services in the department of Otolaryngology of the Cleveland Clinic Foundation. New facilities including sound insulated rooms and special rooms for the examination and treatment of speech and audiological cases are being constructed. Referral to local therapists for treatment specialties is planned.

Speech correction students from Montclair, New Jersey, State Teachers College recently conducted a survey of the elementary school children in Partroy, New Jersey, under the direction of Ellen Kauffman. The results of this survey led to the establishment of service in speech correction in the school system.

The University of Pittsburgh recently received a grant from United Cerebral Palsy Association of the Pittsburgh district. This grant will make it possible to increase speech correction services for cerebral palsied individuals in the eight counties of southwestern Pennsylvania. Both diagnostic and therapy facilities will be increased at the Speech Clinic on the campus. At the same time, a survey of community needs will be made throughout southwestern Pennsylvania. Following this survey a demonstration center will be set up in one of these out-lying counties. During the second year of the grant several additional centers will be opened. By the third year of the grant it is expected that four or five such demonstration centers will be in operation. Each of these centers will make it possible to try out in a field situation, some of the therapy procedures

which have been developed on an experimental basis in the Speech Clinic.

According to Lewis M. Terman, Emeritus Professor of Psychology, Stanford University, a study of 18,000 scientists listed in *American Men of Science* who got their bachelor's degree between 1924 and 1934 showed that it is not the large university but the small liberal arts college that has the best record of turning out scientists.

The American Telephone and Telegraph Company has announced that the Bell system patented inventions, including the transistor, may be used without payment of royalties by American manufacturers of hearing aids. The Bell system offer was made to hearing aid companies by letters from Western Electric.

Sedgwick Mead has been appointed Medical Director of the California Rehabilitation Center at Vallejo. Sponsored by the Kaiser Foundation, the Center conducts the nation's largest non-governmental program devoted to the neuro-muscular rehabilitation of children and adults handicapped by various types of paralysis.

Jack Matthews was recently appointed Chairman of the Committee on School Health which is a sub-committee of the Mayor's-Citizens' Committee on Maternal and Child Health. This committee is composed of professional and lay people from the Pittsburgh area. It will study activities of the Health Department of Pittsburgh in the area of School Health with the end in view of making recommendations concerning the improvement of this program.

Major General Lewis V. Hershey, Director of Selective Service, has requested that State Directors of six selected states establish advisory committees whose purpose would be to provide the service with reliable information on scientific, engineering and other specialized personnel. Because of the increasing technical nature of many occupations, the selective service director felt that some system should be set up to provide local boards, where necessary, with expert advice. These committees serve as advisory only.

A course in Medical Testimony in Malpractice and Negligence Cases for practitioners of medicine, law and allied professions will be given for the first time by New York University—Bellview Medical Center's post-graduate Medical School in cooperation with New York University School of Law. Under the direction of Maxwell H. Popple, Professor and Chairman of the Department of Radiology, N.Y.U. College of Medicine, sessions will be held every Thursday evening from October 7, 1954 to March 10, 1955.

Meetings Announced

American Speech and Hearing Association, October 25-27, Hotel Jefferson, St. Louis, Missouri.

Speech Association of America, during week of December 26th, Conrad Hilton Hotel, Chicago, Illinois; week of December 26th, 1955, Hotel Statler, Los Angeles, California. Regional meetings: Eastern, March 31-April 2, 1955, Hotel Statler, N. Y.; Southern, first week of April, 1955, Memphis, Tennessee; Central, April 1-2, 1955, Hotel Jefferson, St. Louis.

State Speech Correction Meetings: New York, Statler Hotel, Buffalo, March 25-26, 1955; Pennsylvania, William Penn Hotel, Pittsburgh, October 8-9, 1954.

First International Instrument Congress and Exposition, sponsored by the Instrument Society of America, Convention Hall, Philadelphia, September 15-21, 1954.

International Society for the Welfare of Crippled, September 15-17, The Hague, Netherlands.

National Society for Crippled Children and Adults, November 3-4, 1954, Boston, Mass.

New Materials

A bulletin entitled, 'Counseling for Psychological Acceptance of Disability,' has been published by the office of Vocational Rehabilitation, U. S. Department of Health, Education and Welfare, Washington, D. C.

A limited number of copies are available for free distribution. Requests should be directed to Dr. James F. Garett, Chief, Division of Program Service, Office of Rehabilitation, Office of Health, Education and Welfare, Washington 25, D. C.

A new plastic-base magnetic recording tape which has been in the process of development over the past few years has now become commercially available. Technical specifications and superiorty of the tape in tensil strength, impact strength, tear strength, softening temperature, moisture effect, and elongation are discussed in the May issue of Audio Records. Available gratis from Audio Devices, Inc., 444 Madison Ave., New York 22.

A new edition of the publication *Training and Research Opportunities under the National Mental Health Act*, which has been revised to reflect policy changes with respect to traineeships and research fellowships, is available from the National Institute of Mental Health, Bethesda 14, Maryland. Copies of the pamphlet may be purchased for ten cents each from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

Science References Sources, useful guide to more than 1,200 representative bibliographical reference tools has been announced by the University of Illinois Library School. The list includes general works in engineering, agriculture, and medicine as well as source material in the pure sciences. A limited number of copies are available from the Illini Union Book Store, Champaign, Illinois for one dollar each.

The Future Scientists of America Foundation for the National Education Association, 120 116th St., N.W., Washington, D. C. has prepared a survey of teachers' opinions and experiences with sponsored incentives programs in guidance material service. The report of this inventory entitled 'Encouraging Future Scientists' is available free.

Workers in fields involving acoustical measurements now have available an *American Standard on Letter Symbols for Acoustics*. Published by the American Society of Mechanical Engineers under the procedures of American Standards Association, the new pamphlet lists more than 100 symbols. Copies may be obtained for one dollar from A. S. M. E., 29 West 39th St., New York 18.

A new journal in the field of noise control is to be published within the year by the Acoustical Society of America, according to the decision made at the meeting of the Society's Council on February 13. Designed to meet the growing need of diverse groups of noise control specialists, the journal is expected to be published four times a year beginning next October. The quarterly is not intended to be archival in character; it will not compete with the *Journal of the Acoustical Society of America*, the organization's official publication. The content will include case histories and regular columns of technical, medical, and legal aspects of noise control.

University Microfilms, Ann Arbor, Michigan, announces the availability of the following microfilms of possible interest to speech therapists and audiologists: Flower, Richard, M., A Cinefluorographic Study of the Respiration of Children with Hypertonic Spastic Type of Cerebral Palsy, Ph.D., Northwestern Univ., 1953, Microfilm no. 7030, 264 pages, $3.30; Bernhardt, Rodger Burton, Personality Conflict in the Act of Stuttering, Ph.D., Univ. of Mich., 1954. Microfilm no. 7605, 86 pages, $1.08; Berlinsky, Stanley Louis, A Comparison of Stutterers and Non-Stutterers in Four Conditions of Experimentally Induced Anxiety, Ph.D., Univ. of Mich., 1954, Microfilm no. 7604, 120 pages, $1.50; Edmondson, Harold Swan, The Seashore Measures of Musical Talent as a Prognostic Guide in Language Rehabilitation for Persons with Asphasia, Ph.D., Univ. of Mich., 1954. Microfilm no. 7646, 81 pages, $1.01; Leberfeld, Doris Trepel, An Investigation to Determine the Language and Speech Training on the Measurable Mental Abilities of Mentally Retarded Children, Ed.D., N. Y. U., 1953, Microfilm no. 7133, 116 pages, $1.45.

Graduate Assistantships Fellowships and Scholarships

This section, an annual feature of the December issue, lists part-time graduate appointments, fellowships, and scholarships specifically designated for graduate work in speech and hearing. General university fellowships and scholarships, unspecified as to area of concentration, and full time graduate positions will not be included. Only those announcements received too late for the December issue are printed in other issues.

Copy should be submitted to the News and Announcements Editor, and should include formal title of appointment, institution, and unit; dates, general duties, and remuneration; name and address of persons receiving application. Deadline for receiving copy is two months prior to the publication date.

Assistantships. University of Pittsburgh. 18 hours per week of clinical duty. $1,530 per year. Work in area of children as well as adults available. Address Jack Matthews, Speech Clinic, University of Pittsburgh, Pittsburgh, Pa.

Assistantships. University of Denver, Children's Speech Clinic. $200.00 per quarter starting fall, 1954. Students may carry 12 to 15 hours toward graduate degrees in speech pathology or audiology. Address Ruth M. Clark, Children's Speech Clinic, University of Denver, Denver, Colorado.

News About People

Mary Beach and Sheila Durbin, have been appointed speech and hearing therapists at the Hartford, Conn., Public Schools.

R. Corbin Pennington has been appointed to the Board of Directors of the Henry Hudson School for Brain Injured Children, Yonkers, N. Y.

Larry Schendel has been appointed Assistant Professor in Speech Correction at the Florida State University, Tallahassee, and will be active in the direction of the Speech Clinic.

Harold K. Brasell has accepted a position as supervisor of Special Education at the Odessa, Texas, public schools.

George L. Davis has accepted a position with the Alaska Crippled Children's Society at Anchorage, Alaska.

Mrs. Zelda Horner Kosh will take a year's leave of absence during 1954-55 for professional study. Martin Speilberg will be acting supervisor of the Arlington, Virginia, public schools speech correction work during Mrs. Kosh's absence.

Notice To Fellows

The Association has recently mailed Certificates of Fellowship to all Fellows in good standing. Every effort was made to assure accuracy in names and dates lettered on these Certificates and in the mailing list. If any error did occur, however, or if any Fellow failed to receive his Certificate, it would be appreciated if he would write immediately to Secretary George A. Kopp.